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The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed Natural Gas from the Province of Alberta, under the Provisions of the Gas Resources Preservation Act by Northwest Natural Gas Company and Alberta Natural Gas Grid, Ltd.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session: JUNE 6th, 1950.

Volume 8

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VOLUME 8

June 6th, 1950.

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VOLUME 8

June 6th, 1950.

MR.NOLAN: Mr. Chairman, and Members of the Board, it will be recalled that when the marketing phase was opened, it was introduced through the instrumentality of Mr. Copp, who is an employee of the Northwest Company, and who presented a submission in writing which was marked as Exhibit No. 5 in these proceedings. After Mr. Copp had given his direct evidence we took the position that it would be well to introduce by way of evidence the testimony of the heads of companies and high executive officers, the heads of those companies situated in the Pacific Northwest. Now, in order to facilitate those gentlemen it was necessary for Mr. Copp to stand down at the end of his direct testimony, and I am now going to call him again to answer questions which my learned friends or the Board have to direct to him, after which I intend to ask Mr.Slipper to return to the witness box, because it will be remembered that his cross-examination was not completed and I understand that Counsel for the Board, and perhaps the Board itself, have some questions to direct to Mr. Slipper. I will ask Mr.Copp now to return to the box, if he will, please, and I will inform Counsel that it was Exhibit Number 5 which was introduced by this witness.

I think I should perhaps remind the Board that so much evidence has been given since Mr. Copp was here, that his evidence was to the effect that he had obtained information from the various companies, whose representatives came before the Board, and that he had compiled a submission based upon information obtained from those companies. That may not be remembered by all interested

parties at this stage, but that is the fact, and the Tables which are appended to Exhibit 5 are no more and no less than a compilation of the Tables which were provided by the companies themselves, and they are put in a composite corm for the convenience of the Board.

MR.McDONALD: Mr. Chairman, I have a few questions of Mr. Copp.

THE CHAIRMAN: Yes, all right.

....

FULTON W. COPP, recalled, already sworn, cross-examined by Mr. McDonald, testified as follows:-

Q Mr. Copp, on page 197 of the record you referred to some of your past experience. I think you referred to the fact that you had made a survey of the market in the City of Detroit?

A I assisted in such a survey.

Q You assisted in such a survey?

A Yes, that is correct.

Q Who was your employer at that time?

A Mr. E. F. Moore of New York City.

Q Mr. Moyen?

A Mr. Moore, M-o-o-r-e.

Q What date was that survey made in?

A In 1930.

Q In 1930?

A Yes.

Q Now, since that time gas has been introduced into Detroit?

A That is correct.

Q And have you had an opportunity of considering the results of your survey with the market which was eventually estab-

lished?

A Yes, sir.

Q What was the result?

A The market today greatly exceeds what I estimated at that time. However, I might add that this survey that we made was based entirely for industrial gas, it had nothing to do with domestic or commercial users in the City of Detroit.

Q What was the result as applied to industrial gas?

A Oh, I do not recall or know how much industrial gas is sold in Detroit now, but I do know that the use of gas in Detroit, it has greatly increased in the last 20 years.

Q Now, as I read the record, too, Mr.Copp, you state that since March, 1948, you have been continually surveying the market in the Pacific Coast area?

A That is correct.

Q And what work have you done personally?

A I have spent considerable time with each of the distributing companies, and I have interviewed and talked to most of the industrial consumers throughout the whole area.

Q Now, just what industries did you particularly investigate?

A Oh, on a number of occasions I have been in Trail and talked to the people of the Consolidated Mining & Smelting Company. I have talked to industries in the vicinity of Spokane, Tacoma, Seattle and other places along the proposed route.

Q Yes. Now, did you make an independent survey apart from the utility companies?

A No, sir, not of the domestic nor commercial nor industrial within their corporate or franchise limits.

Q So that you are content, as a market expert, to accept the submissions that have been made by the Public Utility Companies?

A Yes, sir, I am.

Q In the form in which they have been presented?

A Yes, that is correct.

Q Now, just dealing with Trail, did you have a discussion - let us first make this clear, as I understand Dr. Sutherland's evidence, the potential market in Trail is approximately 1,800,000,000 MCF per year?

A I do not recall exactly what Dr.Sutherland said. I think his figures are approximately the same as I have.

Q He states....

A But he probably divided it between Trail and Kimberley.

Q Yes. I just wanted to make that clear. And did you have a discussion with the officers of the Consolidated Mining & Smelting Company in regard to the matter of price?

A No, sir, I had no discussion concerning price with them.

Q Then there is a second part of the Consolidated Mining & Smelting Company potential market, and that is at Kimberley?

A Yes, that is correct.

Q And that is about approximately 1 billion cubic feet?

A I think that is substantially correct.

Q Now, did you have a discussion with regard to the matter of price at Kimberley?

A No, sir, I had no discussion with anyone at Consolidated concerning price.

Q So that on Table B of your Exhibit 5 the direct industrial for British Columbia is a combination of Kimberley and Trail loads?

A That is correct.

Q Now, did you make the survey personally for the potential load at Trail, Rossland and Kimberley?

A For industrial gas?

Q No, no, I am thinking of domestic and commercial?

A Yes, I have been over the cities quite a bit.

Q We have not any other evidence here except yours in regard to that particular subject?

A That is right.

Q And the same applies to Fernie and Cranbrook?

A That is correct, sir.

Q Now, I note in Exhibit 2 a reference to the City of Nelson. Has there been any survey made in the City of Nelson?

A No, sir. I have been in there but I have not made any estimates at this time for the City of Nelson.

Q In any event, Nelson would only come into the picture if your Route A was used?

A Or Route B.

Q Or Route B?

A That is correct.

Q Well, now, if Nelson is going to be attached to your Route B, it would require a further pipeline would it not?

A That is right. It would require some 15 or 16 miles to reach Nelson.

Q From Waneta to Nelson?

A From Columbia Gardens over to there.

Q Now, there is one other thought, Mr. Copp, that was injected by Dr. Sutherland, and that is the question of this additional load at Trail arising out of the use of gas for slag fuming. Now, if you interpret his evidence the same as I did, before that load would be attached technical research would have to be completed to make it possible to use gas for that purpose?

A That is what I understand, yes.

Q So that as matters presently stand the additional potential load is not a matter that can be taken into consideration?

A It requires further work, I think, on the part of Consolidated.

Q Now, in your discussions with the utility companies on the Pacific Coast that gave evidence here last week, did you go into the matter of price?

A No, sir, I did not.

Q Was there a discussion of the question of demand and commodity rate by the pipeline utilities?

A No, not as such.

Q Not as such?

A They did not discuss price, nor I did not discuss it with them. We only talked about potential load.

Q There is one thing with regard to the utility companies and the pipeline company, the rate to be charged by the pipeline company will be subject to approval, that is, in the United States, by the Federal Power Commission?

A That is correct.

Q Have you had any discussions with the officials of the Federal Power Commission as to the form of rate and the rate?

A No, sir.

Q Now, you will recollect, I think, Mr. Copp, that Mr. Cook, at Page 369 of the record, stated his company would have to sell interruptible industrial gas at 20 cents per MCF in order to compete with fuel oils. What have you to say about that particular price?

A Well, that is Mr. Cook's problem, I think. He selected that price; I did not have anything to do with it.

Q I take it then, your evidence is that you did not indicate to him that your company would sell gas to the Portland

Gas Company at less than 20 cents?

A We had no discussion about price at all with the Portland Gas & Coke Company.

Q Well, is it a fair interpretation of his evidence, as you recollect it, that he would have to sell his gas, or make his industrial sales at 20 cents to the consumer?

A I do not know about that particular figure. I assume that in order to sell industrial gas that Portland Gas & Coke Company will have to sell it in competition with fuel oil.

Q Can you tell us whether Mr.Cook was right in his 20 cent figure?

A No, I am afraid I cannot. I am not familiar enough with certain of those low price industrials that he is probably referring to.

Q Now, do you know if any other officials of your Company have discussed the matter of price with the Portland Gas Company?

A Not to my knowledge they have not.

Q Yes. Your Company did ask Portland Gas Company to reply to a query as to what the position of that company would be if the average price of gas at the gate at Portland was 30 cents per MCF?

A Yes, I think that was given here in this Hearing.

Q Yes. Now, just what did you have in mind when you said "average price", when you put proposals to them at an average price of 30 cents,what did the Northwest Company have in mind?

A I think the Northwest Company had just what the question states, an average price. I do not think I can elaborate on that any.

Q What I am getting at is this, that average indicates to me that some of the gas would be sold at much less than 30 cents, and some would be sold somewhat higher, and that the average would be 30 cents. I am thinking of the word "average"?

A Well, that is my understanding that the average price for all the gas would be 30 cents under that question.

Q So that the word "average" has no meaning at all as far as your company is concerned?

A Oh, yes, I think it has, just what it means, it is an average.

Q Well, I mean, how would it be an average? Did you work it out on a demand and commodity basis?

A I do not know about that. It might be.

Q So that what you had in mind was if the Portland Gas Company had to pay 30 cents for every MCF of gas that they got, then that would be the average price?

A Well, that would be the question that was asked here of these distributing companies, about these different prices, and it was just as it was stated, that it was an average price. I do not know on what basis they would compute that, or any of the other factors.

Q The only thing I am getting at is, Mr. Cook said that he was going on the 30 cent basis, that is as I interpreted his evidence, that he calculated on selling gas to industrial consumers at 20 cents, and that means that he must buy it at less than 20 cents from the pipeline company. Those are the sales he is making to the interruptible industrial. Now, what rate would you supply that gas as a pipeline company that would allow Mr. Cook to make that kind of a transaction

with his interruptible customers?

A I haven't had any discussion with anyone in Portland concerning any question of a rate.

Q Now, as a market expert, can you tell me how that can be done?

A Oh, I think I would have to know a lot more factors concerning the load before I could discuss it fully.

Q Can you tell the Board how they are going to evaluate or assess the evidence of Mr. Cook that has been placed in evidence before the Board?

A I think what Mr.Cook said stands for itself.

MR.NOLAN: I think that really is a questiom that the witness should not be asked to answer. What my friend is doing is putting Mr. Copp in the position of the Board. Now, surely that is not something that should be done in a proceeding of this kind.

MR.McDONALD: Now, Mr.Chairman, I feel that the Board is entitled to an opinion of an expert, who has qualified as an expert in these proceedings, and I think it is a fair question. I think that the Board does not feel that it is an expert, and with an expert on the stand I feel the Board should have his opinion.

MR.NOLAN: Ask him his opinion.

MR.C. E. SMITH. Suppose I asked him, and then neither one of you would object to my question.

MR. McDONALD: No, sir.

A Is there a question pending? I do not understand.

Q MR.McDONALD: Well, as I understand it, you are familiar with the operations of these utility companies, you spent some years interviewing them, negotiating with

them, and can you tell me how the Portland Gas Company could arrive at the average price of 30 cents per MCF?

A I cannot tell you how the Portland Gas & Coke Company arrived at the price of 30 cents per MCF.

Q I mean, with your knowledge of their operations, how would you arrive at it? How much domestic gas would you sell, how much commercial, and how much industrial, and at what price?

A I have no idea what price Portland is going to charge for any of their gas to the ultimate consumers.

Q What price would they have to sell it at?

A I do not know, sir.

MR. C. E. SMITH: That certainly hekps the Board a lot, I will bet you.

Q MR.McDONALD: Now, Mr.Copp, we had some discussion last week with regard to load factors of natural gas distribution companies. Can you name some companies that you are familiar with that have or that are now operating on a 70% load factor?

A Are you referring to distributing companies or pipeline companies?

Q Distributing companies in the United States? I will tell you this, and I think that it is common ground, that the load factor in Edmonton is 34 or 35%, the load factor in Calgary is between 45 and 50%. Now, we know of those in our own localities. Can you tell us about any of them in the United States?

A Well, I cannot say definitely, but I think that such companies as probably the Southern California Gas Company have a rather good load factor, and perhaps the United Gas Pipeline Company.

Q I am not talking about pipe line companies.

A All right, sir, we will call it the United Gas Corporation then. They are distributing units.

Q I am thinking of the cities, of course, comparable to the Pacific Northwest cities?

A I cannot think of any at this time, Mr. McDonald, that would be in that category.

Q Are you familiar with the load factor of the Michigan Consolidated Gas Company at Detroit?

A No, sir, I am not.

Q Now, if you will just deal with your Exhibit, Mr. Copp?

A Yes, sir.

Q Exhibit 5?

A Yes, sir.

Q On the first page, the second sentence, you say "Primary consideration has been given to the gas requirements in Canada." Now, would you just enlarge on that statement for me, just how you have done that, elaborate it for me?

A Either the Route A or the Route B would make gas available to more people in British Columbia than any of the other proposed routes that I know of, and I think that in itself is one of the important features.

Q Yes. And that is what you mean by that sentence?

A That is right, sir.

Q Now, on page 2, at the end of the second paragraph, you state that there is a possibility of a line through the Okanagan Valley but "Gas service would not be available to Kanloops."

Q Now, can you add something to Kamloops? Is not Princeton in that area, or Merritt?

A Possibly Merritt should be added, but not Princeton. It would be possible to serve Princeton and possibly Merritt by lateral lines in the Okanagan area.

Q Now, can you tell me this, is there a smelter at Princeton?

A I believe there is.

Q Have you any idea of the potential load?

A No, I have not.

Q Do you know if it would be almost equivalent to Trail?

A From what I have heard I do not think it is as large as Trail.

Q Have you allowed anything in any market study for Princeton industrial, or for Princeton industry, I mean?

A No, sir, there is no estimate here for Princeton.

Q And there is no estimate either for these Okanagan communities?

A That is correct, there is none here.

Q Now, on page 3 you refer to the British Columbia consumers, that is, the Consolidated Mining & Smelting Company and the B. C.Electric, and you state that the gas "will be transported for the account of these customers by Northwest Natural Gas Company from the International Border at Kingsgate, B.C., to the International Border at Waneta and near Aldergrove, B.C., respectively." Now, will you just tell me what you mean by "will be transported for the account of these customers"?

A These prospective customers would take title to the gas before it leaves Canada at Kingsgate, and would be transported for their account to the United States over those routes, or over this route discussed here, Route B.

Q Yes. Now, you would then sell the gas to these companies at Kingsgate?

A That is the plan.

Q Yes? And you would have a price fixed at that point, and it would go through in bond, isn't that right?

A I think that would follow.

Q And then you would add to that price, there would be added to that price the cost of transporting the gas into the United States?

A Back to where they picked it up again, that is right.

Q To where they picked it up. Now, the transportation of that gas would be under the jurisdiction of the Federal Power Commission?

A That is probably a legal question, but I think it probably would be.

MR. C. E. SMITH: Go a little more into that, Mr. McDonald. I want to know whether you can bond gas through the United States.

(Go to page 545)

Q Have you gone into the mechanics of this thing, Mr. Copp?

A No, I have not. No, not at all.

Q Have you discussed it with the Customs officials of the respective countries as to whether entries would be made?

A No, I have not done that.

Q Could you tell me this, is there such a thing as a provision in the Customs Acts of the United States and of Canada which would permit you to carry out this procedure?

A I am afraid you will have to ask one of the legal gentlemen about that. I am afraid I can not answer that question.

MR. C.E. SMITH: Neither can they.

Q MR. D.P. McDONALD: It is in your submission to this Board and I just hesitate to think you would make a submission that you have not investigated, in other words, place it in evidence before this Board. I don't know, I want you to tell me.

A Oh, I have discussed this with some of our people and I think that you should enquire as to the legal aspects. I am certainly not a lawyer. I can not elaborate on that statement. This is just a plan.

Q I wonder if this is something we should give serious consideration to or not?

A Oh, I think it should be seriously considered.

Q Now, frankly, what you suggest is that this gas is going to pass through the United States in what is usually termed "in bond", that is, no duty will be paid on the gas entering the United States and no duty will be paid on it returning to Canada?

A I do not know whether there is a duty into either country

on natural gas or not, and the idea of it being transported in bond is again a legal question which I think I am not capable of answering.

Q Well then, why bother with making this transaction at Kingsgate, transferring title? What is the purpose of placing the title in the Canadian consumer at that point?

A Oh, I think it is another safeguard that gas will always be available to those customers.

Q Well, is the purpose and intent to take the gas that may be passing through the United States out of the jurisdiction of the Federal Power Commission or any other authority?

A Oh, it is not my intention but there again I think that borders on somewhat the legal question that I can not answer myself.

Q Well, I see Mr. Dixon has dealt with it in detail. Possibly he can give us a little more information. Now, could you tell me this, do you have a requirement contract or do you anticipate having a requirement contract with your Utility customers, and in particular, the Canadian customers?

A May I ask what you mean by a "requirement contract"?

Q A specific contract that they must take so much gas over the year?

A That phase has not been discussed, Mr. McDonald, with the customers.

Q Now, there are just a few details, Mr. Copp, with regard to some of your exhibits to your Exhibit 5. We will deal with the question of population in Table A-1.

A Yes, sir.

Q Now, you have the heading "Most Recent Estimate". Now, could

you tell me what years you have in mind?

A That is for 1948, and that is an estimate made by the British Columbia and Yukon Directory published in Vancouver by the Sun Directories Limited.

Q And how about the United States?

A The estimates for the United States are generally for 1949 and they are estimates that were supplied by the distributing companies.

Q Now, I think you also have a statement with regard to population in your Exhibit, on page 4, that the present population is in excess of 2,000,000 and was estimated to represent 2,800,000 within the next decade?

A That is correct.

Q Now, what is the basis for that estimate by you?

A I think the 2,000,000 is self-evident now. The 2,800,000 was obtained from the Pacific Board of Intergovernmental Regulations and in their bulletin on populations of the Pacific Coast, and information supplied by the British Columbia Electric Company and their source was the Dominion Bureau of Statistics.

Q Does the Dominion Bureau of Statistics make a 10-year forecast?

A I am not sure about that. I know the British Columbia Electric Company continuously do work on population. That is one of the sources they used and they used the Provincial Government Statistical Department in Victoria.

Q Now, I note in Table A-1 you refer to the Seattle area 625,000. Now, that is very close to the figure that was put in the record by Mr. Jones and Mr. Gellert of 601,000, I

think it was, but Mr. Gellert pointed out that that did not include 601,910 or the record from the Seattle company. Mr. Gellert pointed out that did not include, or did not - - pardon me, that that was far in excess of the area which was served by the Seattle Gas Company. Now, I was just wondering if you have an estimate of the area that is actually served by the Company?

A No, sir, I have not. That information that was contained in here was supplied to me by the Seattle Gas Company.

Q So that you have nothing to say about their estimators of the same market who might have gone to the trouble of ascertaining what the market actually was?

A No, I have no comment to make on that.

Q Now, if you will just turn and deal with Portland, Mr. Copp. Would you explain this to me, I have in the Portland submission, which is Exhibit 8, on the first page, which Mr. Cook placed in evidence, the population of the area served according to the 1940 census was approximately 478,000. Now, that 478,000 is the figure that you have in your Table A-1, is that correct?

A Yes, sir.

Q And then Mr. Cook goes on and states, "It is now estimated to be in excess of 700,000." It is obvious therefore that you used the 1940 figure?

A That is correct. That is the 1940 census for the Portland Gas and Coke Company's area.

Q Now, on page 6 of your submission, Exhibit 5, you have this sentence, Mr. Copp, "In addition, the lower initial cost, lower operating and maintenance cost, and higher load factor

of Route B would make possible a better competitive price for industrial gas."

MR. C.E. SMITH: What page again?

Q MR. D.P. McDONALD: Page 6, the fourth paragraph. Now, what do you mean by "lower"? What are you applying that adjective "lower" to, "lower initial cost" or "lower operating cost"?

A Subsequent exhibits will detail the cost of those routes.

Q And that is something that is still a matter of evidence?

A That is correct.

Q And I take it that that is not in your field of engineering to elaborate further on that?

A Oh, I did not make the estimate of costs for any of those routes.

Q Well then, why did you put it in the Exhibit?

A I think it is an interesting fact.

Q I see. But you are going to leave it to somebody else to prove it?

A That is right, to prove the cost of the routes.

MR. C.E. SMITH: That is a good word. I would like to hear that often, "proved".

Q MR. D.P. McDONALD: Oh, yes, in the same page, Mr. Copp, you state you dealt with the officials of the Consolidated Mining & Smelting Company and the Hanford Works of the United States Atomic Energy Commission. We have not had the benefit of a witness from the Hanford Works. Would you be good enough to tell us who you dealt with there?

A With officials at Richland, Washington, and Washington, D.C.

MR. C.E. SMITH: That clears it up.

Q MR. D.P. McDONALD: Well, I presume they are the executives in charge of this plant?

A Yes, they were, and I do not think I am at liberty to say much more about the Hanford Works.

Q Well, can you tell me this, is the delivery of natural gas to the Hanford Works essential to the successful operation of the Hanford plant?

A Sir, I do not know enough about it. If I did I would not like to discuss it.

MR. C.E. SMITH: And refer it to Senator McCarthy.

Q MR. D.P. McDONALD: You agree with me that the delivery of gas to the Trail plant and the Hanford Works is not essential?

A Oh, I would not go that far. They are getting along without it now.

Q Then you do not agree with Dr. Sutherland?

A Dr. Sutherland says they are getting along without natural gas but it would be very good and perhaps advantageous to have it.

Q Just one other point, that is with Table D of your Exhibit. I just wish you would clear this up, Mr. Copp, you show degree days of 4321. I think the Seattle Gas Company exhibit shows degree days of 4815. Why the discrepancy between the two?

A They may be based on a slightly different formula. Both of those figures can be obtained from the United States Weather Bureau in Seattle. I have seen both of them, and it is a

matter of using the base 65 and how it is treated.

Q Well, the source of the Seattle exhibit was the American Society of Heating and Ventilating Engineers, 1949 Guide. What was the source of your figures?

A Mine, sir, are from the Weather Bureau in Seattle.

Q Now, just tell me this, Mr. Copp. You have estimated load factor 50%. Now are you quite sure that that is a correct figure?

A That figure was supplied to me by the Seattle Gas Company and I can not vouch for its correctness at all because they calculated it.

Q The only thought I have is that my advice is on your 4321 degree days the figure should be 23.6% and for the 4815, as taken for Seattle, the figure should be 26.4. Do you know anything about that?

A No, I do not.

Q All right, sir, that is fine. Now, just one matter of population that probably I should go into, and that is the population of the Vancouver area. Now, on Table A-1, Exhibit 5, you give the population of the Vancouver area as 493,200, is that correct?

A Yes, sir.

Q And that is the population figure on which the deliveries to Vancouver are based?

A That figure was given to me by the B.C. Electric Company and I presume that that is a true statement, that they base their deliveries on that.

Q Well now, have you studied Mr. Davidson's exhibit to the

extent that you can confirm for me that the deliveries he anticipates of the B.C. Electric will be distributed to that population of 493,200?

A No, not definitely. I have been over his exhibit, I assume that that is the area that they intend to serve.

Q Well, I interpret his exhibit to mean that. Now, you will note just above your item of Vancouver area is the Lower Fraser Valley population, 140,000. Now, is there anything in your Exhibit 5 that shows you are going to deliver gas to that population or any part of it?

A We propose to deliver gas to the British Columbia Electric Company and that is in their service area, so I further assume that any distribution of gas will be made by them in the Lower Fraser Valley.

Q Well, the only thought that occurs to me is that that is a fairly large population, is it not, for a fairly large area?

A That is right.

Q Now, if a pipeline was built that assured deliveries to that area, that would be serving a good percentage of that 140,000?

A I think that can follow.

Q And as I understand it, somewhere in either your exhibit or Mr. Dixon's exhibit there is a statement that the population served outside of the Vancouver area by your line is 32,000 people. Is that right?

A Yes, sir.

Q So that you are serving 32,000 and leaving 140,000 people unprovided for?

A No, I would not say we are leaving out the 140,000. Gas

will be available to the British Columbia Electric Company to take care of the entire Lower Fraser Valley.

Q But I just do not find in your exhibit here any estimate of what will be required for that population. Is there any estimate?

A It would be covered by the British Columbia Electric Company's exhibit if it is in there.

Q Well, it is my understanding it is not there. Am I right or wrong?

A Well, I think that Mr. Davidson did not consider it specifically as the load. I think he has given it consideration, and I can assure you that the needs of the British Columbia Electric Company will be taken care of.

Q Now, in contrast to that, Mr. Copp, is it not so that the Spokane City Gas Company would serve just 170,000 people? You have 209,574 for Spokane and Valley.

A Yes. The difference between 209,000 and 170,000 are people that live outside of the franchise area of the Spokane Gas and Fuel Company, and there is no distribution system there at present.

Q Now, is there, either in your submission or the B.C. Electric submission, any estimate of the requirements of the Lower Fraser Valley?

A I do not believe there is. However, these estimates are the furthest projected in the future as 5 years, and I am sure that the B.C. Electric Company will, if not at present, after 5 years take care of all that territory.

Q Now, there is just one other question, Mr. Copp. In Table

A you have the heading "Estimated Maximum Number of Domestic, Commercial and Industrial Customers to be Supplied with Gas for Each Market Area". Now, what do you mean by the word "maximum"? I see it is not used by any of the Utility Companies.

A Oh, I think it means what it says, that that is the maximum number of customers at the end of the first year and at the end of the 5th year.

Q Well, we have just ascertained that the word "maximum" does not include 140,000 people that are very close to the pipeline, am I right?

A The British Columbia Electric Company supplied me with the number of customers they expected to serve at the end of 5 years.

Q Well, they do not use the word "maximum" in their estimate. I was wondering why you used it?

A Well, in my opinion this is probably as many customers as will be served at the end of 5 years.

Q Thanks.

CROSS-EXAMINATION BY MR. MARTLAND:

Q Mr. Copp, I take it that you supervised on behalf of the applicants the obtaining of the material which is contained in these various briefs that were submitted by the gentlemen from the distributing companies last week?

A No, I certainly did not supervise it. I talked to them about it but I have no jurisdiction or supervision over any of their exhibits.

Q But in each case they said that they were presenting these

submissions at the request of the applicant?

A That is correct, we asked them to do it.

Q Were you the person who actually made the request on behalf of the applicant?

A Either myself or Mr. Dixon.

Q And can you tell me what you asked each of these companies exactly to do?

A We asked them to prepare tables for us showing their sales by classes of service for the first 5 years of natural gas operation, together with the customers by classes of service and the maximum day demand, and to make it a little more complete we asked them to put in data on the same subjects for the present operation.

Q Yes. Did you indicate in making the request what factors you thought they should take into account in making that estimate?

A No, sir. We did not discuss anything of that nature at all.

Q Was there any discussion with them after they had made the estimates as to what factors they had in fact taken into account?

A No, there were none.

Q Because Mr. Cook of the Portland Company here in giving evidence said that he had taken into account the question of cost price to his company of the gas which that company would be purchasing, and I take it that the same thing applies with respect to all of these companies which submitted estimates.

A I think they considered that in their own estimates.

Q Well, do you know whether they took into account, in making their estimates, the cost price of the gas?

A No, sir, I do not. I did not discuss price with any of them.

Q Do you know whether what Mr. Cook had to say was applicable also with respect to the others?

A No, I do not know how the other exhibits related to Mr. Cook's concerning that subject.

Q You see, I take it from the questions that were addressed to each of these witnesses that they had not taken that into account because they were asked what the effect would be upon their estimates assuming gas was sold at certain assumed prices. Do you agree with me on that?

A All I know about the prices, that their estimates were based on competitive fuels.

Q Actually, Mr. Copp, all they did was to estimate what the market might be assuming that they could obtain gas and sell it at a price which would be competitive with fuel oil, isn't that so?

A Or any other fuel, I think that is right.

Q Were they asked to take into account the question of retail price to their own consumers?

A Oh, we did not ask them that.

Q Do you know whether they did?

A No, sir, I do not.

Q Do you know whether they took into account the question of capital costs for extensions to serve additional customers?

A No, I do not know whether that was taken in or whether even the cost of conversion was taken in.

Q You tell me that you do not know that?

A That is right.

Q You do not know whether they did or not?

A No. I did not have anything to do with the preparation of their exhibits.

Q No, but have you discussed their submissions with them?

A No, not in detail. I have read them all, of course.

Q So that your evidence is you do not know whether they did or did not take into account those sort of factors which I have just outlined?

A No, I can not talk for them on that subject.

Q And the estimates may then have been purely theoretical estimates based on the assumption of being able to sell natural gas at a price competitive with other fuels?

A Oh, I think they know their own markets well enough that they could make those estimates personally.

Q I was just interested if they had been asked to take into account those factors, whether they were asked to take into account those factors?

A No, we did not.

Q You do not know whether they took them into account or not?

A That is right.

Q Now, you have estimated in your brief, Exhibit 5, and my friend, Mr. McDonald, has already referred to it, quite a substantial population increase in the area with which your company would be providing gas. It is substantial?

A Oh, yes.

Q And you state in your brief that the total population of the

area which the pipeline will serve is increasing more rapidly than other sections of Canada and the United States. Does that mean any other sections?

A I think it is generally known that the Vancouver area, with the possible exception of the City of Edmonton, sir, is increasing more rapidly.

Q And it would be fair to assume then, Mr. Copp, that the estimated figure of 5th year requirements which you shown on page 6 of your brief, that would have to be substantially increased for the 5 years next following and so on?

A I think this is a realistic figure for the end of the first 5 years. Beyond that point no one's guess is good.

Q You do not guess that it would go down, do you?

A I do not think so.

Q And you do not think that the graph would be a straight line?

A It won't pick up as fast in the next 5 years as it does in the first.

Q But it will increase?

A I would think it would go up, sir.

Q And the area that is to be served is an area with a rapidly growing population?

A That is right.

(Go to page 559)

Q Now your requirements on page 6 are, at least so far as routes B. and A, are substantially larger than were estimated before the Dinning Commission, aren't they?

A I think that is right.

Q My recollection is that this estimate at that time was in the vicinity of 54 billion?

A That is what I recall.

Q So that this year, on the basis of your additional knowledge and experience, the requirement is increased pretty substantially?

A I do not know that it is increased. It is just a better estimate.

Q Yes?

A Than was available at that time.

Q Bigger and better?

A You may add bigger.

Q It is larger?

A It is larger, yes.

Q That is the point I refer to. Now, referring to this bond gas. As I understand your answer to Mr. McDonald, the gas is to be provided to the Canadian consumers first and the title is to pass before the gas crosses the International Boundary, is that a fact?

A That is the point, yes, sir.

Q Can you tell me just which gas that title is going to pass?

MR. C. E. SMITH: Put a tag on it.

A I would not like to pick out every specific cubic foot.

Q It is going all through the one pipe and you are going to split it at the other end?

A Yes.

CROSS-EXAMINATION BY MR. S. B. SMITH:

MR. S. B. SMITH: Mr. Copp, I do not want to go into the question of route with you in detail at all. As I understand it, you are not putting yourself forward as a specialist on that subject?

A That is correct.

Q You evidence relates more to markets at the present time, but I take it that the position of your company is that it has discarded the Yellowhead route?

A No, sir, we have yet to make a survey of the Yellowhead route.

Q Mr. Dixon, in his submission,I think, said: "I told the Committee that after a cursory inspection I had discarded this route in favour of a route further South because of its remoteness from Trail and the impossibility of serving that important market from a line through the Yellowhead Pass." That is a correct statement of the position of your company?

A Dr. Dixon has been over the Yellowhead route but we have still to make a further survey.

Q He said, "We have made a thorough study of the route but I have assured the Committee that before we go to the Board of Transport Commissioners, we will make a thorough study of such a route through the Yellowhead Pass and prepare estimates of markets and costs of construction and maintenance."

A That is right.

Q And further on he said: "The most practical and economical is one which goes through the Crow's Nest Pass and then turns South through Kingsgate to a point near Spokane, then West to a point North of Seattle with lines North to Vancouver and South to Portland. There is no question but that such a route across the State of Washington is by far

the cheapest to construct and easiest to maintain."
Would you be in agreement with that statement of Dr. Dixon?

A I have been over all these routes and I do agree with that statement.

Q Mr. Copp, a statement has also been made in evidence, if you recall, which says that Spokane was the nearest large American city to the gas fields of Alberta which would supply a good market for natural gas for a long period of years. Is that correct?

A Yes, that is true.

Q And Spokane, according to the estimates, would provide a market for 3,587,400,000 cubic feet at the end of the 5th year. That is quite an important potential market?

A Yes, sir, that is true.

Q And they would lose that entirely with the road running through the Yellowhead Pass?

A Yes, that would be an extremely long lateral line to reach Spokane.

Q Well, it would be impossible, would it not?

A I think it would be.

Q And the Trail market. Incidentally, would you think the Trail market, that the Trail plant, is probably the biggest industrial, single industrial, user, potential user of natural gas in all of Western Canada?

A I am quite sure that is true.

Q And the Yellowhead route by-passes it also?

A Yes, it misses the Trail plant.

Q Are you in a position to say whether there seems to be a reasonable possibility in Trail using that additional 2,100,000,000 cubic feet of gas for slag fuel?

A I am not familiar enough with that research to answer completely on that particular operation. I think Dr. Sutherland said that they would consider it very seriously.

Q Are you in a position to tell us whether the fact of losing the Trail and Spokane and those other markets would have any bearing upon the economics of the construction of the gas pipe line to the Pacific Coast?

A They certainly do.

Q Will you enlarge on that for us for a moment?

A Trail, of course, provides a very constant take of gas which is important, and the Spokane market, while not the largest, it is a very substantial market and it could be easily served by this route.

Q You have, I understand, not included anything for the Hanford plant at all in your estimates?

A Oh, yes, sir. The direct industrial in the State of Washington.

Q The direct industrial?

A That is right.

Q In your sketches I do not think you actually show the construction of the pipe line?

A Oh, yes, it is shown.

Q On which one is that shown?

A Route C map.

Q The reason I asked you that was it does not seem to go down as far as Hanford?

A It goes to the edge of the reservation.

Q I see. Then I will not go into that any further. Thank you.

DIRECT EXAMINATION BY MR. NOLAN

Q I was just going to say if no one else has any questions there is one thing I wanted to ask. The information which you requested the distributors to provide was information which you had been asked to furnish the Board?

A That is correct.

Q In other words, that was to meet the requirements of the Natural Gas Resources Preservation Act of this Province?

A That is right.

Q And when you say that your Route B will serve more people in British Columbia than any other route, you are referring, I suppose, to what is contained in Table A1 of your own submission, Exhibit No. 5?

A That is right.

Q And when you say that route will serve more people in British Columbia than any other route, you are referring to Routes A and F as are disclosed in that Exhibit?

A That is right.

Q And the evidence is that Route B will serve 671,000 people as compared to 641,000 for Route F?

A That is right.

Q And Route A would serve 6,000 more people than Route B?

A That is right.

Q And then we assume that Route B serves more people than Route F, and Route A serves more people than Route B?

A That is correct.

Q And when you were discussing the preparation of this information with the distributors, you told one of my learned friends that price was not discussed. But am I

clear about this - and I am referring to the answer that you gave to my riend Mr. Martland - that it was assumed in your conversation with the distributors that the gas supplied would be at a price which would compete with the fuels that they were using?

A Yes, that is correct.

EXAMINATION BY DR. GOVIER

Q Mr. Copp, I assume that Tables A, B and C and C1 and C2 all refer to Route B and the market associated with that route?

A That basically is so but in the text we have eliminated certain markets that would be covered or eliminated by other routes.

Q It is not your intention to supply similar tables for the other routes merely to modify those as you have done in the text?

A That is right.

Q Your submission shows that the load factor for Route B is of the order of 72 per cent?

A That is right.

Q And am I right in assuming that the reason for that high load factor, that is high as compared with the other routes, is the fact that the Trail and Hanford markets, both large industrial loads, are included on Route B?

A That is right.

Q And without those the load factor would drop to 60 per cent or thereabouts?

A Yes, that is correct.

Q On Table C1 you present information concerning the estimated maximum hourly requirement. I wonder if you can give us

a statement concerning the significance of those figures?

A That estimate was requested in the letter we received from the Board. Actually it does not have too much effect on a natural gas operation with a long distance pipe line because the line itself will offset certain hourly fluctuations. So I do not think that is of any particular importance.

Q In other words the line itself would completely smooth out the hourly fluctuations?

A Yes.

Q What about Table C2? Do you attach much significance to that?

A Not particularly. The maximum day is the important thing there.

THE CHAIRMAN: Mr. Nolan, your company has made inquiries as to the effect the various average prices for gas would have on the estimates of the companies. Do you intend to put anybody on the stand who can explain to the Board how that works out and what the prices would be on the average?

MR. NOLAN: Yes, we have to go into that question of prices, and how this average works out. I intend to put a witness on the stand who will discuss that very completely because it is not too clear at the moment. Certainly Mr. Copp was not in a position to give the Board very much information about it in answer to Mr. McDonald. In an application of this kind we have to be departmentalized to an extent, because one of our officers or servants would not be expected to give evidence on all phases. Perhaps we should have put in the evidence as to that earlier but we thought we were going about it the proper way. We will put

that in and it will be fully discussed before the Board.

THE CHAIRMAN: Then I think we will adjourn now.

(At this stage there was a short adjournment.)

THE CHAIRMAN: Do you intend to lead any further evidence in regard to the load of the Hanford plant?

MR. NOLAN: No. Perhaps this would be the proper place to say that it is not permissible to lead evidence in respect to that operation. We have very little information. Any we have we are not permitted to disclose. It is a matter which comes under the jurisdiction of the United States Atomic Energy Commission.

THE CHAIRMAN: You do not think it would be possible for some responsible official of that body to give the Board a letter confirming the estimate made by Mr. Copp?

MR. NOLAN: Just as to their requirements, you mean?

THE CHAIRMAN: Just as to their requirements, yes.

MR. NOLAN: My advice is, sir, that while we would try, we cannot be assured that will be done. The figure that has been placed on the record is a figure that they gave us. It is not a figure we have created ourselves, so I think the Board can take it that even if a letter were written it would do no more than confirm that figure. And perhaps it does not require confirmation in view of the fact it originated with the Hanford people themselves.

THE CHAIRMAN: We do not want to doubt Mr. Copp's evidence in regard to that, but we did feel if we had something further to support that we would be in a stronger position in dealing with the matter of this load.

MR. NOLAN: There is, of course, I suppose, a channel through our own Government and our own Federal Government and the Government of the United States down to the Atomic Energy Commission. There must be a certain exchange of information as between governments that would not be available to people like us. It was only after some discussion and some difficulty that we were permitted even to release this figure we have placed before the Board. We explained that it was idle to make any sort of a proper market survey and to include the name of Hanford in it, unless there was some approximation of what their capacity to use would be and that it would be of the greatest interest to a Board sitting up here in Canada and determining the question of who should have an export permit. Eventually they gave us permission to release that figure. That is all we have got from them. I doubt if we could get any more.

THE CHAIRMAN: Will you see if you can get any more?

MR. NOLAN: Yes. We will advise the Board about that.

Q MR. McDONALD: There was one more question of Mr. Copp, if I might ask it now. Mr. Copp, in answer to Dr. Govier with respect to load factor of the Route B line you stated that if Trail-Hanford load was eliminated from the system your load factor would drop to about 60 per cent. Now I asked you at the interval if you would make a calculation so we would have the exact figures. Have you been able to do that?

A No, sir, I have not been able to do it completely. I think it would drop approximately to 65 per cent. Referring to

Table B there would be two loads that would be subtracted, that is, namely, Spokane and Wenatchee would be taken off as well as Hanford.

Q I think that is of sufficient importance, I suppose it is only a very simple calculation, Mr. Copp?

A Right.

Q Your present total load is 75,076,000 cubic feet?

A That is correct.

Q And you would take off Trail?

A No, sir, you do not take Trail off. We were referring to Routes A and B now.

Q Yes?

A We take off Spokane, Wenatchee and Hanford.

Q O.K. We will then take it the way you said. Spokane, Wenatachee and Hanford. I was just wondering if we could compare the calculations. The Spokane load was 3,735,000?

A That is correct.

Q And Wenatchee 449?

A 449.

Q And Hanford 8,000,500. That gives you 12,000,864 and you subtract that from 75,076,000 and it leaves you 62,392,000 and that gives you an average of 171,000 Mcf. per day

A I had not checked it but I will assume that is correct since you are - -

Q All right. Your total peak load is 275,893 Mcf.?

A That is correct.

Q And subtracting the peak loads of the three deductions totalling 40,514 gives you a new peak load of 237,379. That gives you a load factor of 72.5 per cent on that Route A line?

A Well, that is very good if it comes out that well.

MR. NOLAN: That is all then. I think I will call Mr. Slipper back to the stand as I understood earlier he has not completed all his evidence. He has so far as we are concerned but there is still some cross-examination.

STANLEY E. SLIPPER, (Recalled)

Q BY MR. NOLAN: Mr. Slipper, you are still under oath?

A Yes.

Q And you are responsible for preparing Exhibit No. 4?

A Yes, sir.

Q Which has been presented to this Board and there was one question I did not put to you in words, Mr. Slipper, which I would like to put now, if I may. It refers to page 28 of your brief and to the Summary of Gas Reserves of Alberta contained on that page. It refers to the total of all these five formations and in the amended figure of 12, what was it, trillion?

A That is right, 12 trillion, more or less.

Q 177 billion?

A Yes.

Q Mcf?

A That is right. No, cubic feet.

Q And that is described as the total of proven, probable and potential?

A That is correct.

Q And I want to ask you this. Is that recoverable raw gas, that 12 trillion?

A That is intended to represent my estimate of the recoverable

raw gas.

Q Just answer my learned friend. I am afraid Mr. Smith is not here. I know he wanted to ask you some questions.

THE CHAIRMAN: Yes, and Dr. Govier has a few questions and if Mr. Smith is not back, Mr. Slipper can stand down and come back again.

MR. S. B. SMITH: May I say I did question Mr. Slipper and I have no further questions.

EXAMINATION BY DR. GOVIER

Q Mr. Slipper, following along the lines of Mr. Nolan's questioning you answered that this total figure is the recoverable raw gas. Are you in a position to indicate to the Board what proportion of this gas may be available to pipe lines?

A No, I am not.

Q Will someone else be submitting that figure?

MR. NOLAN: Yes. As I understand it that raises the question of deliverability and that is something - - does it not, sir?

DR. GOVIER: In part, it does.

MR. NOLAN: We do intend to discuss fully with the Board the question of deliverability and design of line and factors which enter into these matters.

DR. GOVIER: I see.

MR. NOLAN: We did not intend to do it through Mr. Slipper and I doubt if he is in a position to afford the Board very much information on that.

DR. GOVIER: That is fine. Thanks.

Q Also on page 28 you refer to the fact that 7.586 trillion

of the estimate is gas which will be tied into the production of oil and gasoline. I wonder if you can elaborate on that for us, and show how that figure was arrived at?

A That figure is represented by the 2 billion proven and probable of the Carboniferous, the 4,000 potential of the Carboniferous and the 920 of the Proven and Probable Devonian, and the potential Devonian 209. I do not know whether that adds right up now or not.

Q I believe it does.

A That was what I intended it to be anyway.

Q Yes, that adds up, Mr. Slipper. That means that this total includes not only Proven and Probable, it also includes this 4 trillion of potential?

A Yes. I said that proportion of the estimate of 12 trillion.

Q Yes?

A Yes, that is right.

(Go to page 572)

Q On Page 24, Mr.Slipper, at the top of the page?

A Yes, sir.

Q You bring forth your estimate of 4 trillion, that is under the heading of "Brazeau Field", but my interpretation of it is that it is more or less the general foothills area?

A Oh, yes. I used the Brazeau Field as the centre point.

Q But it is that entire area?

A Yes, not where the two wells are.

Q Oh, yes. Mr. Slipper, in going through your exhibit, I notice that you have in most cases calculated reserves to a reservoir abandonment pressure, that is a bottom hole abandonment pressure?

A In most cases, yes.

Q I wanted to ask you if you feel that is the best way to put reserves on a comparable basis, or how you feel about calculating those reserves to a comparable well head abandonment pressure?

A Yes, the point is a reasonable one, because when you abandon the well you think of the well head pressure, but so many of the calculations were taken out to the absolute bottom hole that I left it there, assuming that anybody that wanted to go further and take it back to the well head pressure could do so.

Q I see. But you think that the well head method might be a little better?

A It might be a little more practical, yes.

Q Well, Mr.Slipper, most of my questions were to have related to the difference between raw gas and the pipeline gas?

A Yes.

Q But I understand that I should direct those questions to

someone else?

A Yes. I did not do anything on that at all.

Q That is all I have, thank you, Mr.Slipper.

Q THE CHAIRMAN: Mr.Slipper, on page 114 of the transcript I asked you a question about obtaining the porosity figure in the Jumping Pound field, if that had been obtained from the Board?

A Yes, sir.

Q And you replied you had?

A Yes.

Q Now, as I understand it, you discussed the matter of the data with the Board. The Board has no definite information on porosity, but you discussed it with our engineers. I believe that porosity is a matter of opinion, and, as I understand it, the Board did not give you any official document?

A Oh, that is quite true, sir. I think I stated in the text a little further, a page over, that they were estimates.

Q So that as far as the porosity in any case is concerned, that is your own judgment figure on the pososity and is not information supplied by the Board?

A No. I can say this, it was the conclusion that I came to while I discusssd it with the Board engineers and others.

Q Yes, I realize that. What I wanted to bring out, Mr. Slipper, is that there were no core analyses available from the Jumping Pound field, and that any porosity figure is an estimate or a judgment figure.

A Yes, sir.

Q Based on conditions in other fields?

A That is correct.

MR.NOLAN: And it is the estimate or judgment of Mr.Slipper?

THE CHAIRMAN: Yes, the judgment of Mr.Slipper.

MR.NOLAN: And not of the Board or its engineers or anyone connected with it?

THE CHAIRMAN: Yes.

MR.NOLAN: They were good enough to provide certain information. Upon the basis of that information we make an estimate, we come to the Board with out estimate, and it is ours, sir, it has nothing to do with any official connected with the Board.

THE CHAIRMAN: Would you mind having Mr.Slipper available when Mr. Smith gets back?

MR.NOLAN: Would you permit me just to see if Mr. Smith is available now?

THE CHAIRMAN: Yes.

MR.NOLAN: I have made inquiries, Mr. Chairman, and Mr.Smith is engaged at the moment in another place, so that with your permission I will ask Mr. Slipper to stand down and put on another witness, go on with another witness, it being understood that Mr. Slipper will come back to meet Mr.Smith's convenience.

It was my original plan, if you will remember, sir, to have Dr. Brokaw follow immediately upon the conclusion of Mr. Slipper's evidence, but circumstances arose which made that impossible, and so I am not in a position to call Dr. Brokaw now, but I will, not this week, but at some other time, because we feel it important that he should be here to give the Board the benefit of his long experience in the estimate of gas reserves. It is

unfortunate that we cannot adhere strictly to the agenda, but you know why we cannot, and we are doing our best.

Now, there is another little difficulty. I had intended to call a distinguished engineer, Mr. Swinerton, at this point, in the hope that he would precede Mr. Goodbody. Mr.Goodbody is the engineer who did the actual surveying of these routes about which we are going to give evidence now. Unfortunately, Mr. Swinerton, who was on his way here, was recalled, and will only arrive some time later today. He is on his way to Norway, and I am going to ask the Board to permit me to ask Mr. Goodbody to stand down as soon as Mr.Swinerton comes, and then we will hear from Mr.Swinerton, what he has to say, and then Mr. Goodbody will go into the box again. It is not an ideal way of doing things, but I have to meet the convenience of these people who are coming from long distances, and have a lot of other things to do besides giving evidence here, so that if we leave it at that now and I will go on with Mr. Goodbody, with the understanding that we may, when Mr.Swinerton comes, he will be interjected when he arrives.

THE CHAIRMAN: Yes.

MR.NOLAN: I will now call Mr. Goodbody. For the information of counsel and the Board, Mr.Goodbody will deal with those briefs which are entitled "Description of Route and Estimated Construction Costs, Route A and Route B."

....

DAN S. GOODBODY, having been first duly sworn, examined by Mr. Nolan, testified as follows:-

Q Now, Mr.Chairman, as I have said, we propose through this witness, Mr.Goodbody, to discuss the question of Route A and Route B. Mr.Goodbody, you are an engineer?

A Yes.

Q And by whom are you employed?

A I am employed by Haddock Engineers Limited.

Q And what is Haddock Engineers Limited in a word?

A Haddock Engineers Limited is a corporation engaged in general contracting business which covers all fields of construction.

Q Yes. Does it cover the pipeline field?

A We do some pipeline work, yes.

Q Where is your company?

A Our home office is in Oceanside, and we also have offices in Los Angeles and Albuquerque, New Mexico.

Q And you are what we call in this country, contractors?

A Yes, we are contractors.

Q A firm of contractors?

A Yes.

Q What is the firm of Pacific Pipeline & Engineers Limited?

A Pacific Pipeline and Engineers Limited is another corporation which has to do entirely, practically entirely, with the installation of and construction of pipelines.

Q By which company are you employed?

A Haddock Engineers Limited.

Q And there is a relationship between these two companies, is there?

A Yes.

Q The Haddock Engineers Limited and Pacific Pipelines & Engineers Limited?

A Yes.

Q There is a relationship between them?

A Yes, there is a relationship between them. We quite often work on ventures together where it is a large venture.

Q Now, how many years have you been practising your profession?

A About 25 years.

Q Yes. And have you spent most of your professional career on construction?

A Practically all of it.

Q And does that involve the making of estimates of costs?

A Yes.

Q And what kind of construction have you had experience with?

A Well, it covers a very large field. I started in the County Surveyor's office in San Mateo, and later became Party Chief in charge of location.

Q Chief of what?

A Chief of Party.

Q That is not a political party?

A No. It is surveyor of road location and design, and then went on into supervision of construction work for various contractors.

Q Well, you have had experience in road building,have you?

A Yes, considerable experience in road building. And in 1936 I joined the American Pipe & Construction Company, which is engaged in the manufacture and installation of pipelines.

Q Pipelines for what?

A Pipelines, generally, for water, but they lay both steel

and concrete pipe.

Q Yes?

A In 1942 I was with the Navy as a civilian employee in charge of the construction of the amphibious installations for training the amphibious marines. In 1943 I joined Haddock Engineers Limited, and have been with them ever since, and we have done various kinds of work, both highway and pipeline and building.

Q Yes?

A The last work I was on was work at Los Alomas, New Mexico.

Q What was that?

A It was complete development of an area.

Q How was it being developed?

A Well, as far as, all I will say is that it was developed by us for the Atomic Energy Commission, and it required special permission to get into the area.

Q Have you had any experience with the construction of a pipeline, a gas pipeline?

A We had a gas pipeline, connected with the line that runs from the San Juan basin to Albuquerque, which was part of the Los Alomas line. It is the only actual gas line.

Q Now, when did you begin to do the work that leads up to the preparation of these two submissions? And perhaps, Mr. Chairman, you will give me a number for those now for the purposes of the record. I wanted to deal with Route A first.

THE CHAIRMAN: Exhibit 14.

SUBMISSION RE DESCRIPTION OF ROUTE AND ESTIMATED CONSTRUCTION COST (ROUTE A) MARKED EXHIBIT 14.

MR.NOLAN: And may I have Number 15 for Route B?

THE CHAIRMAN: Yes.

SUBMISSION RE DESCRIPTION OF ROUTE AND ESTIMATED CONSTRUCTION COSTS (ROUTE B) MARKED EXHIBIT 15.

Q MR.NOLAN: When did you begin your work?

A The first work was done, started on the 15th of June.

Q What year?

A 1948.

Q Yes. And describe for me, will you, what you were doing?

A Well, we started out, we got an aeroplane and made an aerial reconnaiscance from all the areas along the Pacific Coast and up as far north as Calgary.

Q And when you say "we did", who was it?

A There were three of us from our Company, and we collaborated in selecting a general route after discussions with Mr. Dixon.

Q And Mr.Dixon is the president of Northwest?

A Yes.

Q All right, what did you do after that?

A Well, then, I went over the entire area by car, that is, all of the area through the States. We did not do anything on Route A at that time; we made a complete survey of Route B.

Q In the States?

A I mean, starting from Macleod and going to Vancouver and Portland, Oregon.

Q Oh, that is from Macleod?

A Alberta.

Q In Alberta.

A Yes.

Q From Macleod in Alberta down through Pincher Creek?

A Down through Kingsgate.

Q You made a survey by car?

A By car.

Q What did you do?

A We took these notes and developed enough information to prepare an estimate, and that first estimate was prepared for Route B in, I believe, January of 1949.

Q Yes?

A Then in June of 1949 we were asked to make a survey and do a similar piece of work on what is now called our Route A, and we made a complete survey using whatever we could to get over the line, that is, we went by car, we walked or we rode horseback and we covered the line on what we call our Route A.

Q Yes?

A And that estimate was prepared and we have that here.

Q And is that generally speaking the nature of the work that you did leading up to the preparation of these reports?

A That is correct.

Q Perhaps it would be an appropriate moment to begin reading this report. Before we read these reports, I see you made reference to Route A and Route B, and we have had some discussion here in the marketing with respect to F. Now, what happened to Routes C, D and E, tell me about that.

A C, D and E are variations of Routes A and B, all of which dipped down into the States. One of them bypasses, crosses by Kingsgate, goes down to Newport, comes back in at Trail, follows through the Allison Pass and continues down. Another

goes directly west from Creston over the Nelson Range and then back down into the States at Northport. Just by Trail would be a better way of showing it. Through the northern part of Washington and then back in at Osoyoos, back into Canada, and then follows over Allison Pass, and the other one stays down in at Northport, goes over what we call the Smackout Pass, goes straight across into the States over to Osoyoos, back into Canada and through the Allison Pass and down.

Q And we were not submitting to the Board detailed descriptions of those Routes in the submission?

A No.

Q You have confined yourself to A and B?

A Yes.

Q But you have estimated the cost?

A We have estimated the cost, and the costs of these other routes are equal to or similar to the cost of Route A.

Q Well, I think with that introduction you can now go on. Tell me this, Mr. Goodbody, before you begin to read. After you have been in the field and have made what perhaps I should call your field notes, - - that is what they are, is it?

A Yes.

Q What do you do with those, what happens after that, the next stage?

A Take them in and summarize the notes, make a summary, and we come up with a quantity of different units, work that would have to be done. To these units of work we apply a unit cost.

Q Give me an example of the unit work that has to be done?

A Well, the clearing, for example, I have broken it down into four classifications of very light, light, medium and heavy clearing.

Q And you treat those separately, do you?

A Each is treated separately.

Q And given a unit cost?

A Given a unit.

Q What do you do with the question of excavation, for example?

A Well, excavation is classified along any route according to what you think you are going to get when you dig the ditch, and we have classified it into three classifications of common, gravel and rock.

Q Is that recognized practice?

A I will say it is a recognized practice by our firm.

Q Just elaborate a little for me as to what is comprised in these estimates. You have mentioned this question of excavation and the question of clearing. What else is there?

A Right-of-way.

Q What does that mean?

A Getting a good right-of-way to get access for your equipment. A good number of miles of access roads are required to gain access to the right-of-way. Then the loading, the hauling, the stringing, the welding, the wrapping and so on, lowering in back-fill, finishing up, cleaning up, and river crossings, highway crossings, railroad crossings, are all taken into consideration.

Q And each one of those units has its cost, is that what you mean?

A We apply a unit cost to each one of those units that we develop.

Q Then what happens, you make a computation?

A Then we condense them and that is our bid or our estimate of cost, you might say.

Q How much time would it take to work up these estimates into final form?

A Well, if a person had a line, assuming that a line was located, had a map in his hand, I would want, oh, two and a half to three months to come up with a figure on this particular piece of work.

Q Have you spent that length of time in your office?

A Yes, we spent that much time in our office.

Q Not only yourself?

A No, a great many other people worked with me.

Q As far as the field is concerned, how much time is spent there in a proper survey?

A Assuming again that the line was located, and I had a map to go over, I would want, oh, three to four weeks to go over this and classify it.

Q Now, how much time have you spent actually in the field, because where there is no route located you were locating it?

A We had to locate a route over which we thought we could build a line.

Q Since June of 1948?

A We were out from the 15th of June - - I have to guess on this, about the 15th of November, we were in the field.

Q How many of you?

A Well, from 1, 2 or 3 of us. I was alone a great deal of the time, I had another man with me a great deal of the time.

Our various people have been out there. I think our firm has had about 7 or 8 different people over the work, that I have taken over or have gone over themselves.

Q You mean actually in the field?

A Yes.

Q So that you yourself were there from June 15th until the month of November?

A Either the 1st or 15th of November that I completed it and went home.

Q Did that complete your field work?

A Well, that completed my field work on Route B.

Q Now, tell us all you did about Route A?

A Then we came back, it was the 20th of May, I believe, 1949, we came back and I think it was the middle of July when I finished that particular piece of work.

Q Well now, you started out in May?

A Yes. Remember that our reconnaissance work, a lot had been done on Route A previous to that time.

Q It had been done?

A By aeroplane, and I had come up and had been through all of Southern Canada by that time, going over and looking for possible routes, bringing a route into Trail, and I think I had a pretty good knowledge of all of Southern Canada by the time we started to make the survey on Route A.

Q So that the reconnaissance that was made in the first instance was a reconnaissance that we can make applicable to both Routes A and B?

A I think you can take the whole strip of country. If we drew

a line crossing through Nelson and Princeton I think we should take most of Canada in that. We had a fairly good working knowledge of the terrain in the entire area down as far south as Spokane.

Q Well then, it was in May of 1949 that you directed your attention to a more detailed reconnaissance of Route A?

A Yes.

Q And that went on how long?

A I think it was the 1st of July or the 10th of July that we finally quit.

Q And what did you do in the course of that reconnaissance?

A Well, we started at Creston and we went horseback to the top of Nelson Range, and walked from the top of Nelson Range to Salmo.

Q How far is it by horseback to the top of the Nelson Range?

A Oh, I think it is about 24 miles across the summit.

Q And how far did you walk?

A We had to walk about 10 miles.

Q Then what happened after that?

A Then we covered the rest of the route by car. There is only one place to go and it is all available to car, that is, you can travel over existing roads and so on.

Q And you made notes as you went along?

A Yes.

Q Well, you looked at the ground. Tell me what you would do.

A We take a topographic map, if it is available, and go over the ground. We have to keep ourselves orientated on the map and the ground and if the country is such that we can scale

the distance off the map, we do that or use the automobile and check the mileage.

Q Does that necessitate stopping the car and getting out?

A Yes, it takes a lot of time.

Q Well, why did you take a lot of time?

A Well, you just can not tell what is the nature of the ground by travelling over it, you have to get out and investigate it.

Q How do you find what is under the ground?

A Well, you have to hope, from your experience, that you have got the right answer to that. When you are in the contracting business that is one of the chances.

Q You do make an examination?

A We might in some cases. In this case we have not done any sampling of the ground or anything like that.

Q Then what else do you do in compiling these notes in the field?

A Well, I don't know of anything else that is done. It is a trial and error situation. We might select a line for 20 miles and have to go back and change it because of something you run into at the end of the 20 miles.

Q It takes weeks and weeks to go over one of these routes locating it?

A Yes, it does.

Q It took you from May until July to go over this Route A?

A Yes, from Creston.

Q Yes. And how far is it? What length of route were you locating?

A 400 miles, I think, I don't remember.

Q MR. S.B. SMITH: Are these different years?

A Yes.

Q MR. NOLAN: We are talking about Route A and talking about 1949.

A One piece we had to do of Route A in 1949 was the section from Yahk in British Columbia to Vancouver. I think it is 400 miles across there, I have forgotten.

Q Going back to Route B, you spent, I have forgotten the months, from the 15th of June to November in making a survey of that route?

A Yes.

Q And that was from Macleod down as far as Portland, was it?

A Well, yes, Portland, Oregon, Vancouver, British Columbia.

Q Tell me why that took so long?

A Well, we were not particularly restricted in our selection of route. We discussed with Mr. Dixon. We had been over the ground. We were told to pick a route we thought we could build the cheapest. That gave us a responsibility to pick a route over which we thought was the best available for a pipeline.

Q Do I understand that you were not only locating a route but you were locating the possibility of where other routes might be?

A That is true. We had to eliminate other possibilities as we went along.

Q And did you eliminate other possibilities?

A We did in our own mind.

Q And what did you eliminate?

A Well, we eliminated everything except Route B, as far as we were concerned.

Q That means to say, C, D and E were thought impracticable?

A Well, I thought this B Route could be built cheaper and there were certain things along those other routes that were impracticable, and would be highly problematical whether they could be built properly or maintained properly.

Q But you were instructed to make a detailed survey of Route A?

A That is correct.

Q And you did that?

A That is right. We selected the best possible route.

Q Now, you have spent a good deal of time on this, haven't you?

A A great deal of time.

Q How much time within the last two years, we will say?

A I spent 18 months, I would say, out of the last two years in this work.

Q Yes, exclusively on this work?

A That is right, 18 months out of the last 24, I would say, were on this.

Q And out of that 18 months, would it be fair to say you have spent 6 or 7 months in the field?

A Yes.

Q More than that?

A Six or seven months would be close enough.

Q Yes. And you have done in this instance what you have done in other instances when you have been asked to go out and locate a route?

A Yes, our field work is identical. The only thing we did not have to do, we took a map like this strip map, go over it and classify it. We would not have to worry about a lot of things. We would have to do as much detail locating a route

so that we could get over it.

Q Now, if you spent 18 months out of the last two years on this particular project, and you have?

A Yes.

Q That is not all that your firm has done?

A No. There have been other people that have been over the route with me. I would say that possibly as much as 18 months by other people also.

Q So that there was 36 months of work done?

A Yes.

Q By you and your associates?

A Yes.

Q In the preparation, may I say, of these two exhibits here?

A That is correct.

Q Or in the work . In that work there is behind it reconnaissance in the survey, in the estimates, on the pipeline, in the cost figures, all leading up to the preparation of Exhibits 14 and 15?

A Yes.

Q I suppose when you are undertaking a task of this kind you have to seek advice from the people who are interested?

A Well, certainly the principals of two companies would not want their name on something that they had not been fairly well familiarized with, and we have gone over it. Besides that, other people have been interested in it. It has taken a lot of discussion.

Q With whom?

A Well, Mr. Scholles of Morgan Stanley has been over the line.

He and I have gone into this page by page. He has done a tremendous amount of work. And Mr. Copp has been over the line with me, I believe at two different times.

Q That is the gentleman who gave evidence a few moments ago?

A Who preceded me. Mr. Wilson of the firm of P.& G.E., now with Pacific Pipelines Limited. Mr. Chapin went over the route. Don Dabell was general superintendent of Haddick-Engineers Limited, and Mr. Laulehere, formerly with the Pacific Pipeline, they have all been over it, and it has been discussed.

Q Is it fair to say that it was as a result of what you saw and did, and as a result of what these other people saw and the advice they gave you which has led to these two exhibits?

A Yes. I think it is finally the mutual agreement of these various people. Everyone in the company has his say before we make a bid. That is the only time that everybody can talk and that was done here, everyone who entered into it at all had his chance.

(Go to page 591)

Q Is that true of both these companies?

A Yes.

Q So that it is not a solo effort by any means?

A No, it is not a solo effort.

Q It is a result of all these discussions that took place between yourself and the officers of your company?

A Yes, sir.

Q And those were senior officers?

A In some cases and in some cases junior.

Q You did the actual work of preparing the exhibits, but not altogether, I do not suppose?

A No.

Q Tell us about that, if you please.

A In how much detail? Do you want all -- this is broken down.

Q I mean putting it actually down on paper. Some of these figures, for example, are worked up for you, I take it, by your associates?

A Yes, some of the figures in here, for instance the coating figure, I went out and got people that specialized in pipe coating to give me a price, a flat price of so much per mile on coating the pipe and that is it. The other figures, the general construction figures and the welding figures, those things that pertain directly to the pipe line, Mr. Price, who is the President of the Pacific Pipe Line Engineers Limited, and I went over thoroughly together and arrived at the units that we used for that particular work. Dirt work, the analysis of the ground and so on, I took care of myself in consultation with others.

Q What do you mean by "dirt work"?

A I mean grading, an analysis of the terrain. Rock and the

classification of the soil and so on was my work.

Q That went into field notes?

A Yes.

Q You made the field notes?

A That is right.

Q And it is on the basis of those field notes that all the subsequent estimates are based, is it?

A Yes, that is correct.

Q And they were yours?

A Yes.

Q You had possibly some help?

A I had some help. Some of the notes were taken by, a lot of it was done by Mr. Chapin. Mr. Chapin was with me and did a lot of the work and the rest I did myself.

Q I take it that some of the final figures are worked up in your company by someone else?

A The final extension might be made by anybody who could run a calculating machine.

Q That again is a composite effort?

A Yes.

Q I mean, this is a company undertaking. It is a dual company undertaking, is it?

A Yes, it is what we call a joint venture.

Q A joint venture into which both of these companies put forth their best efforts?

A Yes.

Q And that is what was done here?

A That is what was done.

Q Well, now, I think we will proceed and read Route A unless

there is anything the Board would like me to ask with respect to the preparation?

A Shall I read the introduction part of this first?

Q Oh yes.

DESCRIPTION OF ROUTE AND ESTIMATED CONSTRUCTION COSTS

(ROUTE A)

INTRODUCTION

This exhibit has been prepared by Haddock-Engineers, Limited and Pacific Pipeline & Engineers, Limited of Los Angeles and San Francisco at the request of the applicants. It contains a description of the Grid System and of a Canadian pipeline route from Alberta to the Pacific Coast.

The detailed attention paid to this route was in all phases similar to that received by Route B. The whole section was covered by Mr. A. Faison Dixon during his aerial and ground reconnaissance survey work in 1947. In 1949 our engineers completed the detailed field work necessary to obtain an accurate estimate of the cost of constructing a pipeline along this route.

Also included is a summary of the construction cost estimates for the Grid gathering system, the main transmission line and the various sales laterals. Some of this material is the same as that presented previously in this application. It has been included in order to make this exhibit complete in all respects.

The following tabulation is a summary of the total cost of construction of the Grid System and of Route A:

Alberta Natural Gas Grid Ltd.	$34,789,070
Alberta Natural Gas Company	73,976,782
Northwest Natural Gas Company	21,952,937
TOTAL------------	$130,718,789

I may say those are all American dollars.

CONCLUSIONS

As a result of field investigations and numerous consultations we have reached the following conclusions:

1. The construction of this Canadian line to the Pacific Coast will cost $20,000,000 more than the Canadian-United States route (Route B).

2. It will be approximately 50 miles longer from the grid system delivery point to the Pacific Coast.

Q MR. NOLAN: What is that point?

A From Pincher Creek Station to the delivery point on the coast.

3. In respect to certain important markets it is badly located. For example, it will not be economically feasible to supply the Hanford Works of the United States Atomic Energy Commission. Consequently, the load factor will be reduced to a level which is regarded by authorities as uneconomical.

4. The difficult nature of the terrain, lack of access roads and adverse climatic conditions will affect construction time. It is estimated that a third summer will be needed to complete the project.

5. It will be necessary to traverse certain areas subject to landslides and earth movement. Great difficulty will be encountered in constructing the line through the Allison Pass. In this mountainous section serious slides

are prevalent and it may be necessary to resort to exhorbitantly expensive tunnelling. The problem of approaching the Pacific Coast from the interior of British Columbia is one of extreme difficulty, but with all its drawbacks the Allison Pass is the only route that might prove feasible. These factors, coupled with poor accessibility, will offer a significant hazard in insuring continuity of service.

6. The adverse conditions mentioned above will be reflected in greatly increased maintenance costs as compared to those for the Canadian-United States route.

7. The high capital cost, difficulty of maintenance, and susceptibility to interruption of operation will result in a high cost of gas to consumers without the inherent benefits of a completely dependable service.

DESCRIPTION OF PROPOSED SYSTEM

Alberta Natural Gas Grid, Ltd.

Alberta Natural Gas Grid, Ltd. plans to construct a natural gas pipeline system that will gather gas from various producing fields in the Province. It will transport gas for the account of Canadian Western Natural Gas Company, Ltd. and sell gas to gas utilities or communities in the Province at wholesale along its system. The grid system will also supply the natural gas requirements of Alberta Natural Gas Company.

Gas from the Princess area will flow south to Burdett through a 14-inch pipeline while gas produced in the Foremost and Pakowki Lake districts (Pendant d'Oreille and Manyberries fields) will flow north to Burdett through a 16-inch pipeline. From this point a 20-inch line will be

constructed west to Granum where the principal compressing station of the grid will be located. In order to gather gas in the north and to supply or transport gas for others, it is planned to build an 18-inch line from Granum to Langdon and a 16-inch pipeline from that point north to the vicinity of Legal. Gas produced in the Jumping Pound field will be delivered to the main system at Langdon through a 14-inch line. In order to provide gas to the system of Canadian Western Natural Gas Co. Ltd. a line will extend from the main system near Langdon to Calgary.

From the Granum station a 24-inch pipeline will extend southwest to connect with the main line of Alberta Natural Gas Company several miles west of Pincher Creek Station. The gas produced in the Pincher Creek field will flow north to the main line. The towns of Cardston and Pincher Creek will be served directly from this field as shown on the map.

The construction of the grid system should be accomplished at a minimum cost as no physical difficulties are anticipated in the area.

Q Turning to the map for a moment, can you tell the Board and my learned friends that it is to be found on the back of the report, the first of the two maps. It is entitled "Alberta Natural Gas Grid Limited"?

A Yes.

Q There is no page number, Mr. Chairman, but it is easily found. It is also entitled "Projected Natural Gas Gathering System." You have read a description. Looking down at the bottom of this page, I see Pincher Creek. The main line will

run a branch to Pincher Creek, will it?

A That is a line coming into the main line down to the town of Pincher Creek.

Q Yes, that will be a branch won't it?

A It will be a branch off the gathering system.

Q It is a 12-3/4 inch line?

A That is a gathering line, that is from the Pincher Creek field and it comes into the main gathering line.

Q The 12-3/4 inch line?

A Yes.

Q And there is a smaller line from that field at Pincher to Cardston?

A That is correct, a 4-inch lateral.

Q And if we come back to the main line it is a 24-inch line?

A Yes.

Q And I see it goes right up north to the top of this map to a point called Legal?

A That is correct.

Q And those lines that run from the Viking-Kinsella field that are lighter lines are existing pipe lines for natural gas?

A That is our information, yes, sir. Those exist.

Q Now when you come down to our main gathering line to the vicinity of Calgary, I see there is a feeder line out to the Jumping Pound area. That is right, is it not?

A Yes, a 14-inch.

Q I observe too that there are existing pipe lines running from Turner Valley?

A Yes.

Q These are lighter black lines. Now, when you get down to the lower right-hand corner of the map, there is the Princess field marked?

A Yes.

Q And the Princess, a line from the Princess field down to the Bow Island field?

A And down to Burdett.

Q Down to Burdett and down below from the Pendant d'Oreille field there is a line running to Foremost and then again to Burdett?

A Yes.

Q Where it meets that other branch at Burdett?

A And runs in a westerly direction to Granum. That is correct.

Q That is what is known as the Grid System?

A Have you skipped the line, the 10-3/4 inch line running into Calgary?

Q Yes, I was going to ask about that afterwards. What is that?

A That is a feeder line, as I mentioned in the text, to feed the existing system in Calgary.

Q Yes? And from your main - -

A The main gathering system.

Q The main gathering line, there will be a feeder line into Calgary?

A Yes.

Q And then Jumping Pound, that will also come into Calgary, that line from Jumping Pound?

MR. C. E. SMITH: It goes by it.

A It goes by it. It can be connected but it will depend on the location.

Q MR. NOLAN: The description you have in your brief is that the branch from Jumping Pound passes Calgary and into your main gathering line?

A Yes. It is there and available if they want to hook it to it.

Q Why are these called "grids"?

A I imagine that the reason they were called a grid system is because of the normally rectangular surveys in some of the flat countries or it covered existing fields. It was more or less a grid system. The way this is stretched out it does not look much like a grid but I imagine that is the derivation.

Q It is just a gathering system?

A Just a gathering system, yes.

Q And these lines that run from all the existing gas fields eventually find their way into the main gathering line?

A Yes.

Q And from there on, as you have told us, from this junction near Pincher Creek and from there it goes on down to the States. I think that is enough about that map. You can go on now with your text.

A

GENERAL DESCRIPTION OF ROUTE

A general description of the route of the main line is as follows: It starts at Pincher Creek Station at the end of the Alberta Natural Gas Grid, Ltd. gathering system and then runs westerly passing near Cowley and Lundbreck, thence to Blairmore and Coleman, through the Crow's Nest Pass to Michel, Natal, Fernie, Elko, Cranbrook, Yahk to the Creston Valley of the Kootenay River.

MR. NOLAN: For the convenience of counsel, if they will look at Route A, which is the map that just follows the one we have been discussing, it is entitled "Alberta Natural Gas Company and Northwest Natural Gas Company. Projected Natural Gas Transmission System, Route A." It will assist in following the text because the text follows the map.

A That also is the red line shown where the blue intersects or runs along the blue over to the red and includes the red line running down south to Spokane from Trail.

Crossing the river the route continues over the Nelson Range to Columbia Gardens. At this point a lateral line is planned south through Waneta, B.C. and Smackout Pass to Newport, Washington and thence on to Spokane.

Q And that is that line that runs down South?

A Yes, that is the section running south.

The main line continues westward from Columbia Gardens through Trail, Rossland, Cascade, Osoyoos, Princeton and Hope to Aldergrove and New Westminster.

At Aldergrove the 22-inch line to serve United States markets continues southward to Bellingham, Monroe, east of Seattle and Tacoma to Longview, Washington where it crosses the Columbia River and proceeds on to Portland, Oregon.

The system will serve the towns and cities of Vancouver, Cranbrook, Kimberley, Trail, Hope and others in British Columbia. Spokane, Seattle and other communities in Western Washington will be served and those presently supplied by the Portland Gas & Coke Company. The Hanford

Works of the United States Atomic Energy Commission would not be served..

Pipeline lengths have been calculated by scaling the best available maps, or by speedometer readings where the country was too rough for accurate measurement by this method. To these distances various judgment factors have been added to compensate for anticipated vertical and horizontal deviations.

DETAILED DESCRIPTION OF ROUTE

Pincher Creek Station, Alberta
to
Aldergrove, British Columbia

Alberta Natural Gas Company

Q And Aldergrove, is that the place that is just on the boundary?

A It is just north of the boundary. Right at the intersection of the blue and the red line on the west or left side of the map.

Q That is where one line goes off to Vancouver and the other one goes to Portland?

A Yes.

Q So now you are about to describe for us in detail the line where it begins at Pincher Creek and where it ends at Aldergrove in British Columbia?

A Yes.

Q And the first section is?

A Pincher Creek Station to Bellevue - (15.7 miles)

Leaving the prairie, the line drops into the valley, crosses the Castle River, then runs across country south of Cowley and Lundbreck. The line meets the highway

it crosses the Crow's Nest River and parallels it to Burmis, then runs cross country to a point northeast of Bellevue. This is through slightly rolling country, with the exception of a few short spaces where the country is classified as rolling. Some rock will be encountered in this area, but in general, conditions are good for both construction and maintenance.

Q Those places are all marked on the map?

A Yes.

Q Some of them are not very clear?

A No, because the line goes over them.

Q And now we are going from?

A Bellevue to Coleman - (9.3 miles)

From Bellevue the line runs about a half mile from the northern edge of the debris from the Frank Slide, over flat terrain containing a great many boulders. Returning to the highway at the Village of Frank the line enters a short restricted area where construction will be more difficult. From this point the line parallels the highway and railroad through Blairmore then runs cross-country to a point north of Coleman. Though this section is rough and construction will be restricted, the ground is stable and will not be hazardous to the pipe line. It is all easily accessible from traveled roads and maintenance conditions will be good.

Coleman to Michel (16.8 Miles)

Leaving Coleman the line crosses a low ridge then runs directly to a pass in the main ridge in the Rockies. This pass is north of the one used by the highway

and railroad. At present it is used for a power line and an old road runs through it. From the pass the line runs to the intersection of Alexander Creek (I do not think that is on the map) and then parallels the highway to Michel. This is all in rough rolling country and a great deal of rock will be encountered. The country is stable and there is nothing that would cause any difficult line maintenance.

Michel to Natal - (2.8 Miles)

The line crosses Michel Creek and follows the highway through Michel. It then crosses the railroad which it follows until it reaches a point west of Natal, where it recrosses the railroad, the highway and Michel Creek. The pipeline will be in filled ground, and there will be congestion during construction. It is all accessible from existing highways and maintenance conditions are good.

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Q What do you mean by "the pipeline will be in filled ground"?

A It is ground that they filled to raise it by taking debris and the fillings from coal mines there in building up the town, so that it will raise it.

Q Yes?

A Natal to Elko - (40.8 miles)

From Michel Creek the pipeline is parallel and adjacent to the highway for about 6 miles; it then stays south of the railroad where the highway moves to the north. The pipeline follows along the south side of the railroad through Hosmer and Fernie; then along the old road through Morrissey to Elko. Between Hosmer and Fernie the pipeline will have to swing quite high to avoid sidehill construction. Between Fernie and Elko the pipeline is in country mostly favourable to construction, with the exception of about 3 miles which is quite rough, but there is little rock. Access will be over existing roads, and maintenance problems will be few.

Elko to Wardner - (27.8 miles)

From Elko the pipeline runs to a point across the Kootenay River from Wardner. This is in semi-rolling country wheregood construction and maintenance conditions exist. Access to the pipeline right-of-way will be from existing roads.

Wardner to Moyie - (26.7 miles)

The pipeline runs west from Wardner, skirting to the south of Mt. Baker through a pass between Moyie Mountain and Cranbrook. Some rough country is encountered between Wardner and Gold Creek, where there will be some fairly difficult construction as it will be largely in rock. The pipeline

intersects the highway at Moyie. The pipeline from Moyie north for about 4 miles is in rough gravel country. Access will be along right-of-way from existing secondary roads, and maintenance conditions are good with the exception of the last four miles in which access will be difficult.

Moyie to Yahk - (22.4 miles).

From Moyie the route follows the road and river and railroad through Yahk to the intersection with the Creston Road. Some parts of this section will be difficult to construct because the valley is narrow. There is, however, sufficient room to avoid, in general, sidehill construction. Access is good from existing highways.

Q Is it considered an advantage to avoid sidehill construction?

A Very definitely.

Q Why?

A Well, the first thing, you have to flatten out a bench wide enough to get your equipment over and to move your pipe in, and you have extra work right away. It means a lot of extra dirt to move.

Q There would be, I should think, added difficulty of maintenance?

A Well, that is very true. You would still have to maintain it on the sidehill, which is very bad.

Q All right.

A Yahk to Summit Creek - (33.0miles)

Leaving the Kingsgate-Creston road intersection, the line follows the highway (B.C. Route 3) to a point about five miles east of Creston, then runs through a pass north of Creston and drops steeply into the Creston Valley. From this point the line runs across the Creston Valley and the

Kootenay River to Summit Creek. The construction in this section will be in gravel to the point north of Creston. The valley floor will be wet construction, and since this area is subject to floods, the pipeline will have to be anchored. Access will be over existing roads.

Q How do you anchor a pipeline, Mr. Goodbody?

A Well, you put enough weight on it to overcome the flotation, either cast iron or concrete.

Q You weigh it down?

A Yes, it just put enough weight on it to weigh it down.

Q Because flood is a serious difficulty?

A Well, with no weight on tie pipe, well, it is just good practice to weight a line.

Q Where it is subject to flood?

A Yes, where it is subject to flood.

Q Otherwise it will float away, won't it?

A It might very likely float out. I have seen it come up through the ground, and I have seen them float.

Q And always when you are considering the location of a line, is it fair to say that you have in your mind the difficulty or the ease of maintaining that line?

A Well, a person must always keep that in mind. Of course, if you cannot do it in the first place, you cannot get in there to maintain it. It is just that easy. If the country is going to be tough to get in, it is going to be tough to maintain, and you must keep that in mind at all times.

Q Yes?

A The history of an area as to whether or not it is subject to floods is something that is very important, and that you have to check on.

Q Did you go into the history of this area over Route A?

A I saw the history. I saw it when it was flooded.

Q When history was being made, you were there?

A Yes.

Q What did you see?

A Well, the whole valley was covered with water while I was there, all across in this particular area, and further down in the Fraser River Valley, in 1948.

Q Yes. Well, all right, I think we will go along now. By the way, in this particular section it is over existing roads?

A Yes.

Q Now, you mentioned roads in one or two other places. What is the importance of excess? The excess in this particular section is over existing roads?

A Yes.

Q These may seem very simple questions to you, Mr. Goodbody, but I would like to hear what you have to say?

A It is very important to be able to get into the proximity of your pipeline.

Q Yes?

A You do not necessarily have to have a road along the pipeline, or have the pipeline on a road, but they should be, I would say, in proximity to something that you can get over with equipment.

Q Yes? But the road that is required by you, the operator of a pipeline, is what kind of a road?

A Well, the road is generally something that you can get through, it has to be something that we can get the equipment over.

Q All right. We are at Summit Creek to Salmo Valley, that is the next, isn't it?

A Yes.

Summit Creek to Salmo Valley - (37.3 miles)

The line follows the course of Summit Creek to the summit of the Nelson range. It then follows Lost Creek westward to a point about four miles east of the highway, and finally swings north over a ridge and intersects the highway at Goat Creek. This section of line is very rough. Construction would be in sidehill. There are numerous slides to be traversed on the east slope of the range. The elevation at the divide is sixty-five hundred feet, where twelve feet of snow lay on June 15, 1949. The terrain drops steeply from the divide both to the east and west. From the bottom of the west slope, the land flattens, but for some distance is subject to snow slides. A large part of this section would be in rock. Access roads for pipe and heavy equipment hauling would have to be from Bonners Ferry, Idaho, along the west bank of the Kootenay, before entering the right-of-way. Maintenance would be very difficult, and, since the line would be subjected to slides, a considerable amount of such maintenance would be anticipated.

Q Now, you have talked here about snow slides, and are they a difficulty in the way of maintaining a pipeline? Just elaborate on that?

A Well, there are two dangers, The snow slide might cover or carry your pipeline away and, of course, it fills up your access to the pipeline to get beyond the snow slide. It has to be cleared in case you have to get in.

Q Now, that would be true of rock slides or mud slides?

A Yes, any kind of a slide.

Q Any kind of a slide?

A Yes.

Q That is one of the hazards of locating these lines?

A Yes.

Q And you have to keep that in mind too, do you?

A Yes.

Q Because that is so directly related to the question of maintenance?

A Yes.

Q All right. Salmo Valley to Columbia Gardens?

A Yes.

Salmo Valley to Columbia Gardens - (29 miles)

The line leaves Goat Creek and parallels the highway to a point south of Salmo, then crosses the Salmo Valley and intersects the road to Trail and follows that road to Columbia Gardens. Columbia Gardens is about eight miles east of Trail in the Columbia Valley. This section is mostly gravel and earth; rock is encountered near Columbia Gardens. The line will be in wet ground crossing the Salmo Valley, and pipe will have to be anchored. From this point a lateral line runs in a southerly direction to Spokane.

Q I see here you talk about a section being mostly gravel and earth, and that rock is encountered near Columbia Gardens. I suppose that is one of the main elements in cost, is it not?

A Yes. There is not a great deal of difference between the handling of gravel and common dirt. There is some difficulty,

and we have made some allowance for it, but the rock, of course, is an entirely different matter. Your price per foot jumps very fast in rock construction.

Q And you have, of course, as well taken into consideration the amount of rock work that will have to be done on this line?

A Yes.

Q As opposed to gravel or earth?

A Yes.

Q All right.

A Columbia Gardens to Trail - (7.8 miles)

Considerable rock and a wash will be found before the line enters the valley. It follows the road to Lawley Creek. After leaving the valley, the line crosses through rough rocky country to the north end of the new housing project at Trail. Access to this section would be over existing roads.

Q What is a "wash", Mr.Goodbody?

A It is a dry wash that runs down, it is quite deep in that particular area. There are quite a few washes that are very deep in the surrounding country. There is quite a drop in there.

Q What do you do when you come to one of those?

A Well, it is a matter.....

Q Of going into it with your pipe?

A It generally goes down into it and up on the other side, just drop in and out again. In one particular case further over, we plan to bridge a deep wash.

Q A sort of overhead pipe?

A Yes.

Q On a bridge construction?

A On a suspension bridge.

Q On a suspension bridge construction?

A Yes.

Q That happens in some instances?

A A little further over.

Q It does?

A Yes,

Q All right?

A Trail to Cascade - (35.2 miles)

This proposed route would cross the Columbia River just north of Stony Creek. The line climbs steeply to a point north of Rossland. From there it traverses a series of ridges, about 4,000 feel elevation, through rough country, and drops into Sheep Creek close to the International Boundary. Continuing westerly it again climbs sharply to five thousand feet and drops into the valley at Lake Christine near Cascade. The road through this country is closed in the winter, and this entire thirty-five miles would be extremely difficult to maintain. Access roads for hauling pipe would have to be constructed from points in Washington following natural water courses.

Q Why is the road closed in the winter?

A Well, I do not know whether they can maintain it or cannot maintain it, or whether they have not the equipment in there to keep the road clear.

Q The answer is that they do not maintain it?

A It is not open in the winter. I have been there two winters and it is not open.

Q Yes. Well, that is a difficulty, isn't it, in the way of

maintaining your pipeline?

A Well, if somebody just kept the road open, but if they are not, if the pipeline is there you cannot get in. We would have to build, as I say here, we would have to build excess roads from down in Washington to get some of the pipe in. We could not use this particular road that is in there because it is crooked.

Q And that has been taken into consideration in the estimates that are coming eventually?

A Yes.

Q These really are field notes of the terrain through which the line passes, describing in a very general way the nature of the country?

A Yes.

Q Is that what it is?

A That is what it amounts to, yes.

(Go to page 613)

Cascade to Midway - (23.6 miles)

From Cascade the line follows the railroad and highway to a point east of Grand Forks. This area is inhabited by Doukhobors. This area is the area inhabited by the Doukhobors.

Q Has that got anything to do with maintaining a pipeline?

A They have had a hard time maintaining the railroad. I don't know what they would do with the pipeline.

Q It is a fact they did blow up the railroad in that area?

A Two weeks ago they broke the bridge. It might develop into a problem.

Q There are none of those people on Route B anyway, are there?

A No, I don't think so. Then, crossing the highway, railroad and Kettle River, it parallels a farm road past Grand Forks and west over a ridge to July Creek. Then it follows a ridge to a pass in the range near Eholt, and descends gradually to Boundary Creek, near Midway. This is rough country. Access roads will have to be constructed or existing trails rebuilt along this entire section.

Midway to Rock Creek -(13.3 miles)

The line west of Midway, following the highway across the Kettle River to Rock Creek, is in fairly open country. Some rock will be encountered, but construction will be largely in gravel. Access to this section will be from the existing highway.

Q I have been wondering when you are reading this if you are using the existing highways for the purpose of constructing or maintaining your line. Are you able to do it in some instances?

A We are using it to get in on to build.

Q And to maintain?

A And to maintain.

Q What is the effect of all that on the existing highway?

A Well, in some cases, or from past experience, there will be some highways that are going to have to be rebuilt, some of the paving.

Q They won't stand up under the heavy loads put over them, is that what you mean?

A No, I don't think so.

Q Is that what you mean?

A Yes.

Q MR. C.E. SMITH: Is the highway on the map on the board? It is not on your map here.

A Well, it is rather hard to do. The road is there. No, it is not either.

Q I am sorry, I did not mean to interrupt.

Q MR. NOLAN: I was going to say for the information of the Board, is the highway shown on the map that is shown on the wall behind the Chairman?

A I do not know. It would be covered up with the tape if it were.

MR. NOLAN: And while we are looking at the map, perhaps you will give it number 16 for the purposes of the record.

MAP PUT IN AND
MARKED EXHIBIT 16.

Q MR. NOLAN: Exhibit 16 is the map on the wall behind the Chairman.

A Rock Creek to Osoyoos - (23.1 miles)

McKinney Creek crosses this rolling country in a deep raving which will have to be bridged. The line passes through Bridesville, crosses the summit, and then drops steeply into the Okanogan Valley, on the east side of Osoyoos Lake. Access roads would have to be constructed from Oroville, Washington for hauling pipe and equipment. The existing road is too crooked to permit the passage of long loads, but is kept open in winter and could be used for maintenance.

I would like to correct that while we are here. The road is being rebuilt on both ends of that elevation, both at Osoyoos and over at Rock Creek. It is being rebuilt. It is steep but we could get over it.

Q There will be an improvement there. Will it permit the passage of long loads?

A Yes.

Q What is a long load?

A If pipe comes out in 60 foot lengths. The road that was there until now, they are working on it now, we would not have been able to get around curves.

Q MR. C.E. SMITH: How do you spell "ravine"? I have heard it often and I have never seen it in print.

A That is the way I spell it.

Q MR. NOLAN: Then from Osoyoos to Keremeos?

A Osoyoos to Keremeos -(31.7 miles)

The line runs north on the east side of Osoyoos Lake and traverses the valley at the north end. This route then ascends a rock slope and follows the

road to Similkameen River Valley, and on to Keremeos. The section between Osoyoos and Similkameen is rough, with considerable rock. Gravel is predominent in the valley and construction will not be difficult. Access will be along existing roads. That section around Similkameen is impassable in there.

Keremeos to Princeton (49.3 miles)

The route follows the highway to Keremeos and on to a point north of Hedley; there the new highway crosses the river, while the line follows the old road. The conditions along this old road are fair, but numerous rock slides in this section will have to be removed. Rock and the existence of power and telephone lines in this section would further hamper construction. Access to this route is good.

Q We used to call this Princeton to Hope sector of the Allison Pass as midway between Princeton and Hope?

A Yes, 42 and 44.

Princeton to Allison Pass (44.8 miles)

This proposed route remains north of Princeton, then crosses the Tulameen River west of town, climbing to a point near the new Hope-Princeton Highway. The first thirty miles is in rough country, but is in generally stable ground. It then enters slide country where large areas are moving. These slides have caused some trouble along the highway and present a continuing maintenance problem. The line is above thirty-five hundred feet in elevation for about forty miles, and reaches a maximum of forty-four hundred feet in two places. Access will be good,

but maintenance of the new highway will have to be considered because of damage which would be caused by the heavy equipment and loads.

Q We have got a reference in this sector, Mr. Goodbody, to slide area, slide country. Now, what do you mean by that?

A Well, in my opinion there are large bodies of gravel in this section that are moving, some of them slow. As soon as they cut the road in there they started to move fast, they came down faster and they have caused a great deal of trouble in the maintenance of the road.

Q It is a very different thing from the slides we were discussing?

A The other are tailless slides that are just rock, weathering down off the mountain. They are built up from the bottom, they are large, tailless accummulations. These are, I believe, glacier accummulations that were built up and have never stabilized themselves. The country is steep and they are moving.

Q But they actually do move, do they not?

A Yes. As soon as they cut the road through there some of them moved very fast.

Q But they are moving anyway?

A Yes.

Q Whether the road was cut through or not?

A I believe in those areas they are moving, yes.

Q Well now, does that present a difficulty to pipeline construction, that kind of terrain?

A Surely, it would put a weight against your pipe, you would

be subject to breaks.

Q Because you are building something - -

A That is not stable.

Q That is not stable but is moving. And it would also increase the costs of maintenance, would it not, and the dangers and hazards of maintenance?

A Well, yes, there would be a very definite hazard. It would also be a hazard to your continuity.

Q If it has all these dangers in it, why didn't you go around it?

A Well, as we have said before, the Allison Pass is, in our opinion, the only place that a pipeline can be built in that part of Canada.

Q Yes?

A And that is the only place we can go through Southern British Columbia and get to Vancouver.

Q Through this Pass?

A Yes, through this Pass.

Q But going through this Pass why didn't you avoid this slide country?

A There is no place to go. The country is restricted, you are bound to be in a certain amount of side-hill or over the top of high peaks.

Q Is it close country, tight?

A Tight. You have no choice of location.

Q And this is a particularly tight piece here, is it?

A There are spots along in this area that would be very tight, some places they are wide open.

Q In other words, it is not all slide country?

A No, these slides might only be 50 feet wide, they might be 100 feet wide. They vary in width depending upon the size of the deposit.

Q But, as you say, they are a hazard in this particular area and you can not avoid them by going around them because the country is too tight. That is the answer, isn't it?

A Yes.

Allison Pass to Hope - (42.6 miles)

The line continues to follow the new highway to Hope. The west slope of the Cascades, while a great deal rougher, does not have the slide conditions which prevail on the east side. It would be as difficult to build the pipeline in this section as it has been to construct the highway. Some of the line would have to be protected from heavy snow slides. Access to the route would be along the highway.

Q Mr. Goodbody, when I question you would you be good enough to turn in the direction of the Board. I am not sure that the Chairman and the members hear all that you say and I do not want this to become a private conversation between us. Now, you have spent a good deal of time in this Allison Pass area, haven't you?

A Quite a bit.

Q You have seen what goes on there in winter and in summer, have you?

A Yes.

Q And what have you seen?

A Well, the snow was kept off the road this last winter, but

A

last year they were given a great deal of trouble with slides going up the east slope and this year - - I would like to correct this a little bit, down just east of Hope they are having a great deal of trouble with the little slides down there. That has developed into quite a bad place.

Q But the highway has been kept open this winter?

A As far as the snow is concerned, yes. They have some short delay because of the slides there.

Q You make a comparison between the difficulty of building a pipeline and constructing the highway?

A Well, the pipeline would have to surmount the same difficulties that have had to be surmounted by the highway in there.

Q Well, those difficulties were overcome with respect to the highway by paying the amount of money it cost to build it through there?

A That is correct.

Q And do you know what it cost?

A I have talked to the people at Victoria and they told me 1500 feet in there cost them $250,000.00.

Q Well, why is that?

A It is in the Skaget Bluffs and it is steep, rocky country. They had to hang the road on the side of the mountain and they went to a lot of expense to get it in there.

Q They had to quarry through the rock?

A Yes.

Q Into the mountain?

A They built retaining walls on the low side and had to cut

the mountain. They did some cutting on the high side.

Q All right.

A Hope to Bridal Falls - (28.4 miles)

From Hope the line follows the highway to Bridal Falls. Some places along this section are extremely rough and rocky. The only available shelf between the mountains and the river is narrow. The highway and the railroad now occupy this space. In low places the pipe will require anchoring against heavy floods.

Bridal Falls to Aldergrove (35.6 miles)

The country in this area is flat farm land. It reaches an elevation of 25 feet, and is subject to floods. Wet excavation is anticipated, and all pipe must be anchored. Except during flood periods, the line would be accessible over farm roads.

(Go to page 622)

Aldergrove to New Westminster - (27 miles) #

The line traverses flat country from Aldergrove to St. Andrews Station, running north to a point near the Trans-Canada highway. It then follows this road to the B. C. Highway 99 intersection and continues across the Fraser River to New Westminster.

#This main 22" line is a continuation of Alberta Natural Gas Company's main 24" line from Pincher Creek Station to Aldergrove. In the tables summarizing construction costs at the back of this Exhibit it is treated as a "Sales Lateral."

Aldergrove to International Border - (3.3 miles)

The 22-inch line to serve Western Washington and Portland, Oregon runs southwesterly from this point.

Q Just going back for a moment to the middle of Page 13, three-quarters of the way down the page in Princeton to Allison Pa s. "Maintenance of a new highway will have to be considered because of damage which would be caused by the heavy equipment and loads." We have been told that the British Columbia government has spent many millions of dollars on this road. Do you know what the cost of it was, of the highway through this sector?

A No, I do not know what the over-all cost was. I think it was 12 million dollars on the 80 miles through there.

Q On the 80 miles alone it cost 12 million dollars?

A Yes.

Q I am wondering whether you would be allowed to use that road, which would be damaged because of the heavy equipment. Is that not a matter that would have to be decided by the British Colmmbia government?

A Yes. There are many things in this sector that would have

to be decided on by the British Columbia government and the Public Road Department. This road, from what I have seen in the past, I do not believe would stand up to the use of any heavy equipment and the heavy trucks.

Q Is not that an excellent reason for a permit being refused?

A You would either be refused a permit or you would have to put up a bond to pay for the repair to their road. I have been in similar places where we had to put up a bond to replace roads.

Q Now this highway - perhaps we have been talking about this route too glibly. This is a matter that has to be worked out between the company and the Provincial authorities?

A Yes, that is right. We have made the assumption here that we would work out something to be able to use the existing road. And that is the only thing you can do.

Q You have also made an allowance for the damage you might do to the existing roads?

A Yes.

Q And where there were existing roads you have avoided the necessity of estimating the cost of building new roads?

A That is correct.

Q And that is fine supposing you are going to get permission to use existing roads?

A Yes.

Q If you do not get that, it is going to throw your estimate out here because you would have to build more access roads of your own?

A You would have to look for another place to build a pipe line because there is no other way or no other place here

you could build a road.

MR. C. E. SMITH: Surely you guys can make a deal with the B. C. Government. They want our gas there.

MR. NOLAN: Yes, I know, probably you are right.

Q You say you would have to put the pipe line some place else because there is not any other place to put it, is there?

A Well I do not know of any other place to put it.

Q You have been all over that country, haven't you?

A Quite thoroughly. I do not think there is any other place than the Allison Pass to go through.

Q I mentioned that as a practical difficulty. If you do not get permission to use that road you cannot build a pipe line through there?

A No.

Q Because there is no room for another road?

A No, there is no proper place to build anything else. You would also run into difficulty disturbing the ground above the highway and I do not believe anybody would permit you to do it.

Q In a slide country that is going to play havoc with your highway down below?

A Yes. And they are going to have enough trouble as it is.

Q It seems to me that is a very practical difficulty in building a pipe line through that particular sector.

MR. C. E. SMITH: Still called Route A. I am wondering why it should not be called B.

Q MR. NOLAN: You are going on to another heading, Mr. Goodbody?

A This is Northwest Natural Gas Company.

International Border to Lynden, Wash. (4.3 miles)

The country through which this section of the line would pass is flat cultivated farm land. The connection with Alberta Natural Gas Company would be made on the border about one-half mile east of Washington State Highway 1 B.

Lynden to Bellingham - (11.5 miles)

The pipeline route extends southeasterly from west of the town of Lynden parallel to a farm road for about three miles. Some wet ground will be encountered in the vicinity of the Nooksack River. Construction difficulties are not expected.

Bellingham to U. S. Highway 99 - (5.5 miles)

The choice of routes in this section are somewhat restricted due to the existence of Lake Whatcom. A route was chosen that follows an unpaved street in a sparsely populated and outlying section. Mostly gravel will be found in the area.

U. S. Highway 99 to Skagit River - (14.6 miles)

From this highway the route bears southeasterly through rolling country; a rough stretch with heavy timber will be encountered near Samish Lake. The line crosses the lake at the location of the present road and bridge; it then proceeds to a point on the Skagit River near Sedro Woolley.

Skagit River to Big Lake - (8.5 miles)

Proceeding southeasterly from the river to Big Lake the pipeline route passes to the east of Sedro Woolley

and Burlington through flat and semi-rolling country. Part of this section is covered with second growth timber and part is cultivated. No construction problems are anticipated. The Skagit River is navigable and an underwater pipeline crossing is planned.

Big Lake to Monroe - (39.9 miles)

This section of the route is through second growth timber and over semi-rolling terrain. The line will pass east of Lake Stevens and Burlington. Access to this route is over secondary roads and conditions for both construction and maintenance are good.

Monroe to Issaquah - (24.2 miles)

All of this section is through terrain that lends itself to easy pipeline construction and is accessible over existing roads. The route lies to the east of the populated Seattle-Tacoma area and Lake Washington. Most of this distance is covered with second growth timber.

Issaquah to Portland - (162.5 miles)

Leaving Issaquah the pipeline route follows a pass in the Squak Mountains then proceeds southerly passing about sixteen miles east of the City of Tacoma and the towns of Orting and Rainier. From Rainier the line passes through the hills and enters rolling country about eight miles east of Centralia. From here it swings west of Toledo, then proceeds nearly due south along the west side of the Cowlitz River. The line follows this course to Longview and goes around the town to the Longview Bridge. It is proposed to use this bridge to cross the Columbia

River. After crossing the river the line proceeds south, back of the high range of hills which parallels the Columbia River, to a point near Scapoose, then southeasterly and easterly to a connection with the system of the Portland Gas & Coke Company at Portland. This entire section is in stable ground where construction and maintenance conditions will be good.

Q MR. NOLAN: I see you say here that you are going to cross the Columbia River in the vicinity of Longview. That is right, is it?

A Yes.

Q And for that purpose you intend to use the bridge. What bridge is that?

A That is the Longview Bridge.

Q What kind of a bridge?

A It is a high bridge. It is high enough so that they do not have to have any draw sections to permit vessels proceeding under it.

Q And what sort of a bridge is it? Is it a traffic bridge or a railway bridge?

A It is a traffic bridge. It is a toll bridge.

Q And when you use a bridge like that to link up your pipeline, what do you do, what kind of construction takes place on a bridge that you are going to put your line across?

A That will depend. It can be strapped on the outside or strapped underneath with steel straps. There will not be any great problem.

Q There are some great rivers in the United States and this is a great river, is it not?

A It is one of the biggest they have got.

Q Have you had any experience about building pipelines across rivers like the Mississippi, because they do that, don't they?

A Some have gone under and some have been built over.

Q Is that not another matter that would have to be taken up with the authorities of the State of Oregon? Or the local municipal authorities?

A Where a stream is navigable it is under the control, in the United States, of the U. S. Engineers Department. They control the type of construction you use. You are subject to their regulations. In general, we have tried to keep above the jurisdiction, that is, to keep upstream of the jurisdiction of the Army Engineers. I would not anticipate any great difficulty.

Q That is a private bridge, is it not?

A This particular Longview Bridge, yes. No, I beg pardon. In the last month or so it has been taken over by the Washington Toll Bridge authorities.

Q All right.

A It was a private bridge until that time.

MR. NOLAN: Now, Mr. Chairman, that brings us to the description of another route and I think that would be a convenient place to break off.

THE CHAIRMAN: Yes.

(At this stage the Hearing was adjourned until 9.30 June 7th, 1950.)